INDUSTRIAL
FINISHING

TEXAS FINISHERS LIBRARY

1 5 1954

For ———— ★ Lightness
★ Cheapness
★ Strength

"HANGITALL"

on the

PRESTON JIG

Now manufactured by a new revolutionary method

"Read all about it"

SEE PAGE 29 INSIDE

JOHN PRESTON & CO. LTD

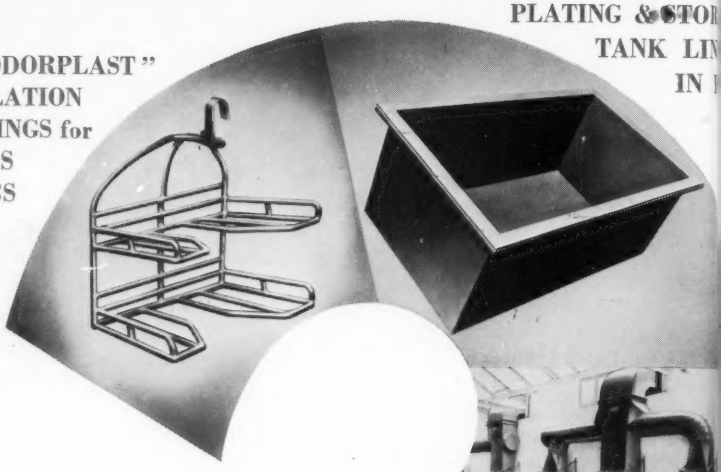
SOUTH ACTON, LONDON, W.3

Tel.: ACORN 0367 & 7240 Grams: HANGITALL, EALUX, LONDON

Why not be safe from Corrosio

PLATING & STOR
TANK LI
IN

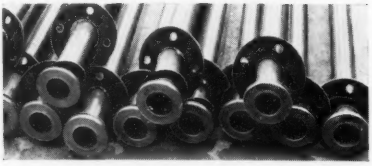
"PRODORPLAST"
INSULATION
COATINGS for
RACKS
& JIGS



ACID RESISTING
FLOOR SURFACES
for CHEMICAL
CONDITIONS

ACID F
EXTRA
FABRICAT
RIGID

Consult us with your acid proofing problems



"VYKEM"
TUBES and
FITTINGS f
CORROSIVI
FLUIDS

PRODORITE LTD

HEAD OFFICE
EAGLE WORKS · WEDNESBU
TELEPHONE WED 0284 5

LONDON OFFICE
ARTILLERY HOUSE . ARTILLERY ROW
TELEPHONE ABBEY 3816 5

LEADING SPECIALISTS IN ACID PROOFING FOR OVER A QUARTER OF A

WHEN IT COMES

TO THE

FINISH

CALL IN

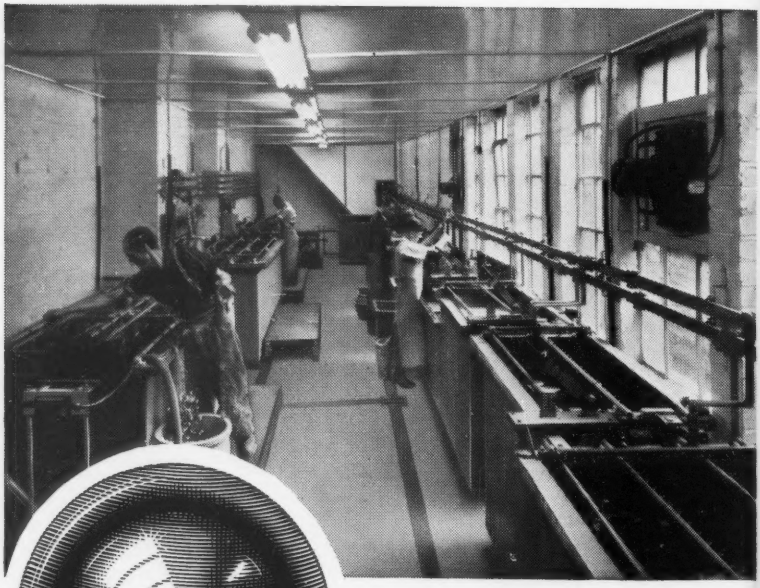
PINCHIN JOHNSON

FOR ALL
INDUSTRIAL & DECORATIVE PAINTS

4 CARLTON GARDENS • LONDON • S.W.1
TRAFALGAR 5600

PRINCIPAL P.J. BRANCHES AND STOCK DEPOTS: BELFAST: Dalton Buildings, Dalton St., *Belfast 58643* • BIRMINGHAM, 1: King Edward's Place, Broad St., *Midland 1042-3-4* • BRIGHTON, 1: 26 Elder Place, *Brighton 23739* • BRISTOL, 1: 37 Welsh Back, *Bristol 20765* • GLASGOW: Ocean Chambers, 190 West George St., *Douglas 3281-2* • LEEDS, 11: 123 Water Lane, *Leeds 24377* • LIVERPOOL, 20: 72 Brewster St., *Liverpool, Bootle 2121* • MANCHESTER, 3: 22 Bridge St., *Blackfriars 3800* • NEWCASTLE-ON-TYNE, 1: Pudding Chare, *Newcastle 21919* • SOUTHAMPTON: 41 Lower Canal Walk, *Southampton 3648*

TEXAS ENGINEERS LIBRARY
SEP 15 1954



Send for YOUR copy of the "EPALEX" Book. It was designed to make your buying of metal finishes easier

Bigger still . . . for even better service

This new Nickel Plating Shop practically doubles our production capacity in this department. It contains the best, most modern and most expensive plant obtainable and can handle articles up to 30″ diameter, including the largest radiator shells. This shop can deposit Nickel at the rate of 0.003″ per hour.

It is 22 years ago since we introduced the "Epalex" System of Electro-deposition to precise standards, by the publication of the first "EPALEX" Book . . . the book that removed all guess-work from the art of buying metal finishes and assured that every buyer ordered exactly what he wanted and got exactly what he ordered.

MEMBER OF THE METAL FINISHING ASSOCIATION MFA

B. J. ROUND & SONS LTD

Established 1864

8-9-10 NORTHAMPTON ST., BIRMINGHAM 18, ENGLAND

Telephone: Birmingham CENtral 2677

Electro-deposition of any metal on to any metal. Parkerizing and Rustproofing processes, Bonderizing Painting and Stove Enamelling.

Use **B.O.C Melamine**

for surface coating resins and ensure—

Excellent adhesion without crazing and hard, flexible, mar-resistant and moisture-proof films ● Compatibility with a wide range of alkyd resins, nitro-cellulose, etc. ● Excellent pigment tolerance ● A fast curing time over a relatively wide range of temperatures ● Colourless and transparent films ● Tolerance to dilution with an excess of hydrocarbons and alcohols ● Anti-tracking properties making the films suitable for many electrical applications.

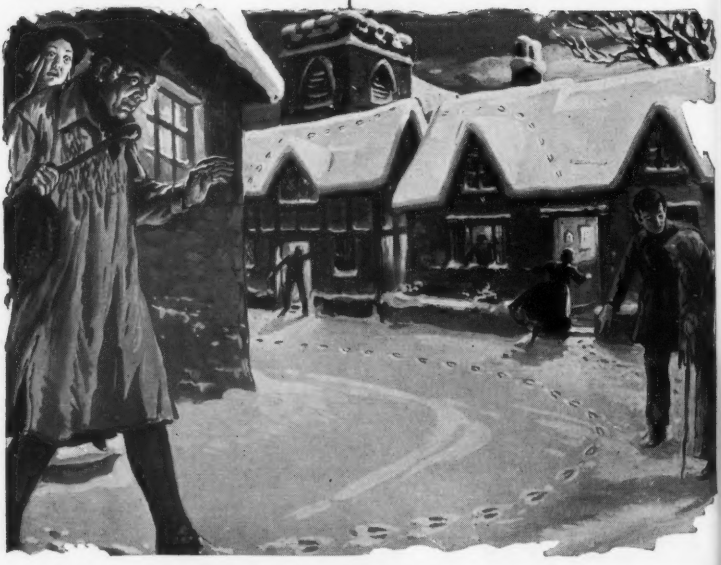
For technical bulletins and service write to:—

Chemicals Division

THE BRITISH OXYGEN COMPANY LTD

Vigo Lane, Chester-le-Street, Co. Durham. Telephone: Birtley 145
London Office: Bridgewater House, Cleveland Row, St. James's, London, S.W.1

VANISHED WITHOUT TRACE...



...THE DEVIL CAME TO DEVON

The snow fell heavily in South West Devon during February, 1855. Rising early for their work, the population of an area of over 100 square miles were horrified to see vast numbers of extraordinary footprints everywhere, which could not be identified as belonging to any known animal or bird. These footprints proceeded in straight lines over roof-tops, walls, in woods, towns, farmyards, taking no account of obstacles. They appeared to be made by cloven hooves, and where the snow was thin *the earth was laid bare, as though scorched.*

Superstitious people quickly decided that they must have been made by the Evil-one himself, and few would venture forth after nightfall for some time. Careful measurements were taken and placed before learned men of the time—but in spite of many theories they could not be identified, to clear up the mystery.

With the melting of the snows these sinister footsteps vanished without trace . . . . .

COLLEX

REMOVES GREASE WITHOUT TRACE

Where Collex is used for degreasing it can be said truthfully that here also, all deposits 'vanish without trace'. Our Laboratories will study any problem and prescribe the correct grade of Collex degreasant to solve it. There are many grades from which to choose, and one of our Technical Representatives will visit you upon receipt of a letter or a telephone call to Liberty 1021.

B. H. CHEMICALS LTD · MERTON ABBEY LABORATORIES, ABBEY ROAD, LONDON, S.W.19. Telephone : LIBerty 1021 (4 lines)

Associated Companies: *Colloidal Detergents of Australia Ltd., Sydney, Australia. Chemical Services (Pty.) Ltd., Johannesburg, South Africa. And at Copenhagen, Amsterdam, Brussels, Paris, Lille, Lyon and Ober-Winterthur, Switzerland.*

Cut finishing costs !!

WITH THE

Morrisflex

MOTORIZED

BENCH BACKSTAND

3 IN 1 : 3 OPERATIONS ON ONE MACHINE, BANDING, GRINDING, MOPPING OR ROTARY FILING/CUTTING.

for DE-FLASHING, DE-BURRING, WELD DRESSING FETTLING, POLISHING SMALL AND INTRICATE CASTINGS, RUBBER MOULDINGS, FORGINGS etc.

ACCOMMODATES 4 DIFFERENT SIZE CONTACT WHEELS: 1½" : 2" : 3" : 4".

SEND COUPON for full details!

Please send me full particulars of the MORRISFLEX Motorised BENCH BACK-STAND

NAME .....

ADDRESS .....

.....

.....

FEATURES

CONSTANT CORRECT BELT SPEED
(Optimum belt speed under all conditions)

PROVISION FOR STRAPPING OPERATIONS
(Maximum surface contact)

ACCESSIBILITY TO CONTACT WHEELS
(Allowing easy manipulation of work)

ABRASIVE BELTS ARE AVAILABLE IN RE-DRESSABLE WOVEN AND STANDARD COTTON-BACKED TYPE.

E. O. MORRIS LTD., BRITON ROAD, COVENTRY. *Tel: Coventry 5081. 'Grams: "Morisflex" Coventry.*

Having a hand in Productivity

IN EVERY INDUSTRY OR TRADE, electrical equipment is the key to modern production methods. There are probably more production-boosting and money-saving devices than you know of. Your Electricity Board can help you and give you sound advice.

They can also make available to you, on free loan, several films on the uses of electricity in Industry—produced by the Electrical Development Association.

E.D.A. are publishing a series of books on "Electricity and Productivity". Four titles are available at the moment; they deal with Higher Production, Lighting, Materials Handling, and Resistance Heating. The books are 8/6 each (9/- post free) and the Electricity Boards (or E.D.A. themselves) can supply you.

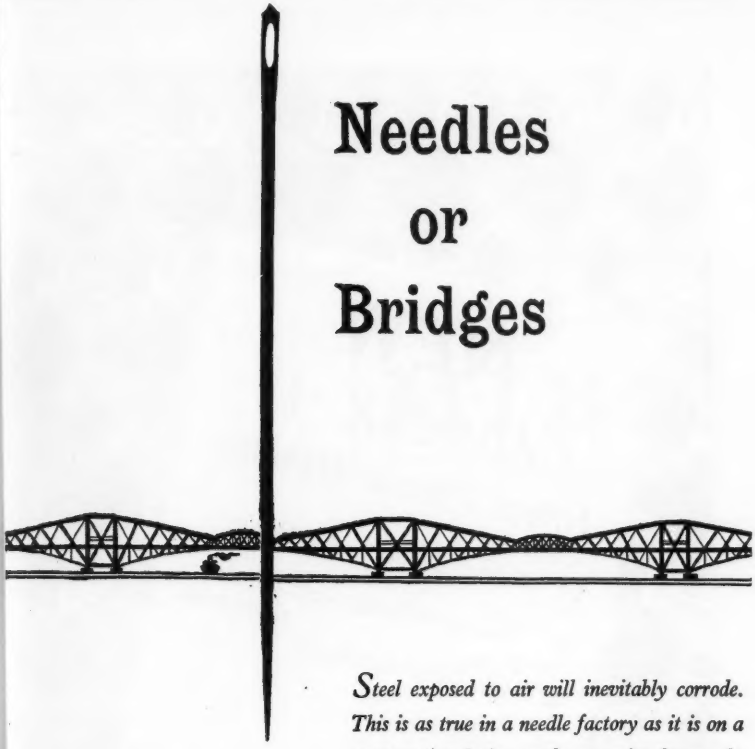
The British
Electrical Development Association
2 Savoy Hill, London, W.C.2.

Strong Man Shifts 3 tons

But wait. He digs the 3 tons first, in one bite. Lifts it high in the air, swings it round, dumps it in the right place. Then he swings back again, ready for the next 3 tons. Time? One minute—one minute for the whole cycle. Strong man indeed—but he has electricity behind him. His hands are on the controls of an all-electric excavator, and he is digging and loading at a rate no score of men could hope to match. (Productivity!) High power under sensitive control is ONLY ONE OF THE AIDS TO HIGHER PRODUCTIVITY THAT ELECTRICITY CAN BRING YOU.

Electricity
a Power of Good for PRODUCTIVITY

Needles or Bridges



Steel exposed to air will inevitably corrode. This is as true in a needle factory as it is on a constructional site; and we can't change the whole British climate for the sake of the six hundred square miles of steel we produce each year. Even if we protect steel by painting, this will not prevent corrosion unless the surfaces have been chemically pre-treated. 'Jenolizing' is a unique process which combines the removal of rust, a self-neutralizing action, and finally—phosphating, which rust-proofs the surface and keys it for paint adhesion.

This comprehensive treatment has been developed in our research and experimental laboratories and Jenolite Technical staff will gladly advise you on rust prevention.

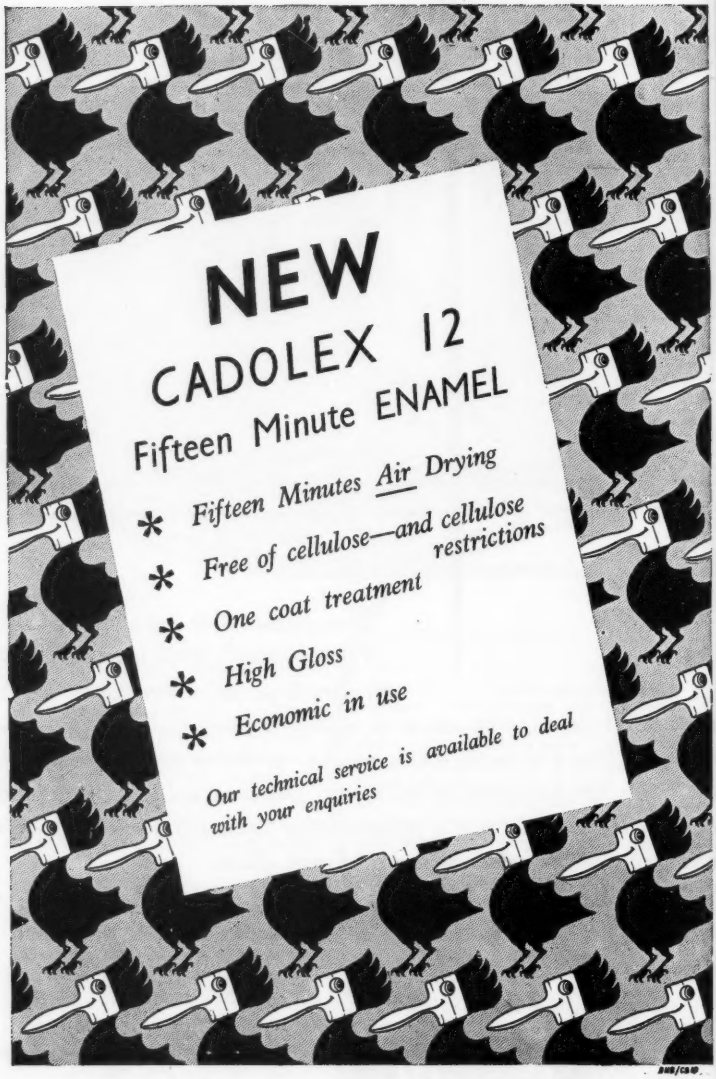
A vast steel bridge is as practical a subject for jenolizing as any small household article.

Jenolite Ltd

London: 43 Piazza Chambers, Covent Garden, W.C.2. Tel: TEM 1745, 3058, 5059

Glasgow: Jenolite House, 304 High Street, Glasgow, C.4. Tel: Bell 2438/9

263.40C


NEW
CADOLEX 12
Fifteen Minute ENAMEL
* Fifteen Minutes Air Drying
* Free of cellulose—and cellulose restrictions
* One coat treatment
* High Gloss
* Economic in use
Our technical service is available to deal with your enquiries

COX BROS. & CO. *(Derby)* LTD. Normanton Road, Derby.
Est. 1781 *And at Nottingham* *Tel: Derby 45484/5/6. P.B.Ex.*

For quality lacquers at low cost

Methyl Ethyl Ketone and Methyl Isobutyl Ketone, two of the Shell range of U.K. produced ketones, have outstanding advantages as solvents for nitrocellulose. Their low specific gravities and high dilution ratios make economies in formulation possible without sacrificing performance or quality, while their high solvent power permits the incorporation of a higher solids content without loss of viscosity control. *Ask for the special folder which gives details of these important technical and economic advantages.*

Shell Chemicals Limited, Norman House; 105-109 Strand, London, W.C.2
(DISTRIBUTORS)

SHELL

Divisional Offices: Walter House, Bedford Street, London, W.C.2. *Tel: Temple Bar 4455* 42 Deansgate, Manchester. *Tel: Deansgate 6451.* Clarence Chambers, 39 Corporation Street, Birmingham 2. *Tel: Midland 6954.* 28 St. Enoch Square, Glasgow, C.1. *Tel: Glasgow Central 9561.* 53 Middle Abbey Street, Dublin. *Tel: Dublin 45775.* 35-37 Boyne Square, Belfast. *Tel: Belfast 20081.*

K4

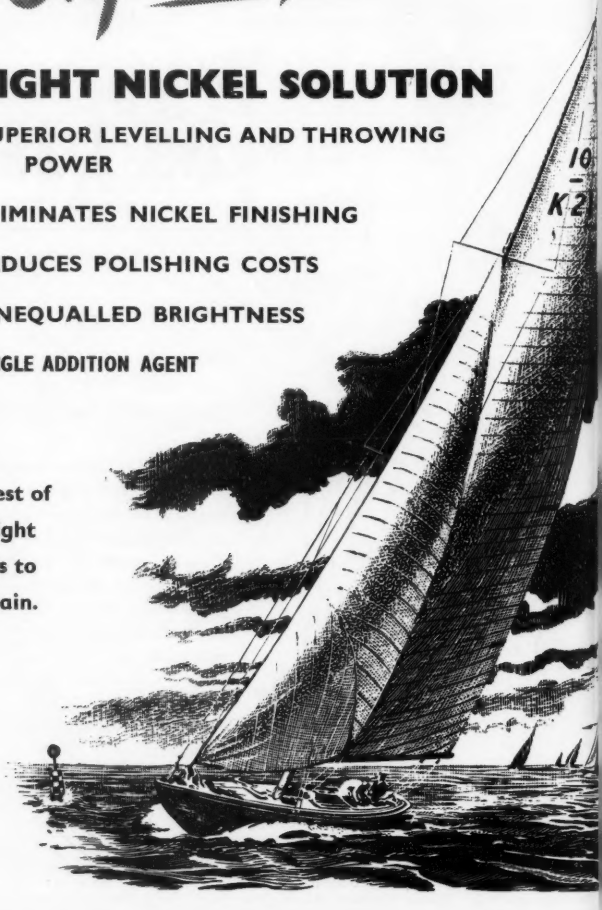
FORGING AHEAD

With CANNING "Super Gleamax"

BRIGHT NICKEL SOLUTION

- SUPERIOR LEVELLING AND THROWING POWER
- ELIMINATES NICKEL FINISHING
- REDUCES POLISHING COSTS
- UNEQUALLED BRIGHTNESS
- SINGLE ADDITION AGENT

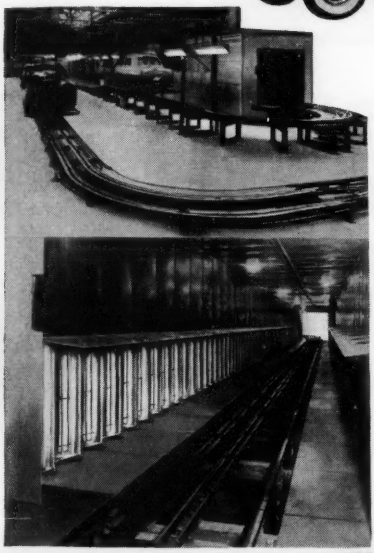
The simplest of all bright nickels to maintain.



W. CANNING & CO. LTD. GREAT HAMPTON ST. BIRMINGHAM 18. LONDON & SHEFFIELD

NEW 2 TONE STOVING FINISH

for ZODIAC bodies



using

METROVICK Infra-red equipment

Briggs Motor Bodies Limited, of Dagenham are pioneers of two-tone stoving on cars. They have installed this new battery of Metrovick infra-red element projectors for stoving the lower section of the Ford luxury car, the Zodiac.

Ordinary convection heating of the enamel resulted in the top half—already stoved in a lighter colour—becoming discoloured through re-heating. The localised infra-red oven, planned in conjunction with Metrovick engineers, has been entirely successful. Each body takes 15 minutes to pass through the oven which is 120 ft. long and has a total installed load of 664 kW.

All British Ford cars are synthetic enamel stoved for a better and more durable finish.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

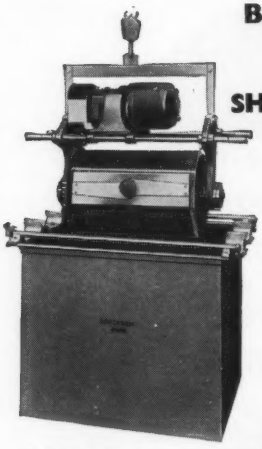
Member of the A.E.I. group of companies

For every type of

PLANT & EQUIPMENT FOR ELECTRO-PLATING AND METAL PROCESSING

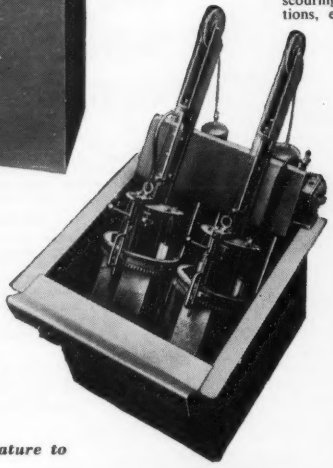
IMPERIAL Plating Barrel Machine No. 159

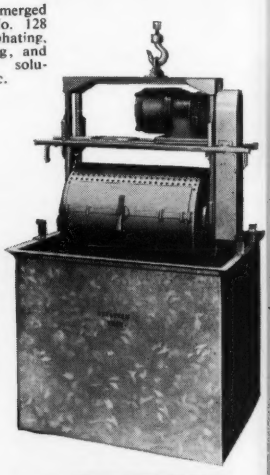
BARREL MACHINES FOR PLATING, TUMBLING, SHAKING, SCOURING AND BURNISHING



Fully Submerged Plating Barrel No. 163.

Fully Submerged Barrel No. 128 for phosphating, cleaning, and scouring solutions, etc.





WILLESDEN Submerged Multi-Barrel Plating Unit.

Write for literature to

Technical Advisory Service

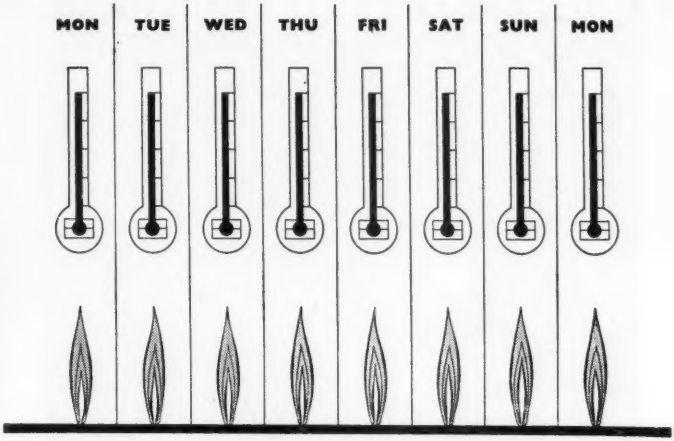
The

HOCKLEY CHEMICAL

Co. Ltd.

Hockley Hill, Birmingham 18. Phone: NORthern 6201/6 PBX. Grams: "Hoklykem" Birmingham

WhiteAd 2888



UNITHERMITY

Thermal uniformity is an important factor in assessing the true cost of your fuel. The heating value of gas is constant, predictable and guaranteed by law. It makes possible precise budgeting, reduced spoilage and better quality goods. Gas saves in other ways. Your bill shows precisely what you use. You do not have the space-and-labour problems of storage and handling because gas comes direct to the point of use, clean, flexible and easily controlled. To the time-honoured advantages of gas are now added the benefits of modern research —new methods, more efficient appliances. The Gas Industry would welcome the opportunity of bringing the latest thinking on gas to bear on your fuel problem.

Course with effect

THE first step towards best results is to consult your Area Gas Board. The services of the Boards' Industrial Gas Engineers are free and are backed by the full resources of the Gas Industry through the Gas Council's Industrial Gas Development Committee. To get things moving, you may like to have this coupon completed **and sent to your Area Gas Board or to the Gas Council, 1 Grosvenor Place, London, S.W.1.**

NAME.....

ADDRESS .....

.....

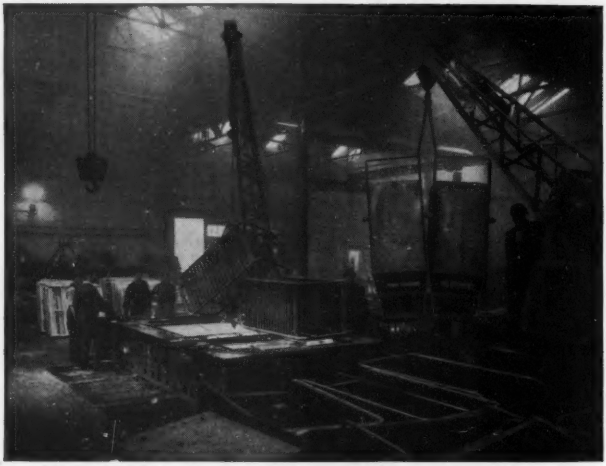
.....

WE NEED HEAT FOR 25

The Gas Industry makes the ***fullest*** *use of the nation's coal*

GCG9A

GALVANIZERS TO THE TRADE



Our Technical Staff will be pleased to deal with any Galvanising problem you care to submit

MIDLAND GALVANIZERS LTD.

KINGS NORTON · FACTORY CENTRE · BIRMINGHAM

Phone: Kings Norton 1256, 1294

When the Light Brigade made history at Balaclava

Parsons already had a 50 year old reputation for supplying the right paint for the job. In a world of rapid change that reputation has remained constant; whatever your requirements we can still supply the best paint. Our Technical Department will be pleased to advise you and, where necessary, to formulate the paint to suit your needs.

Parsons

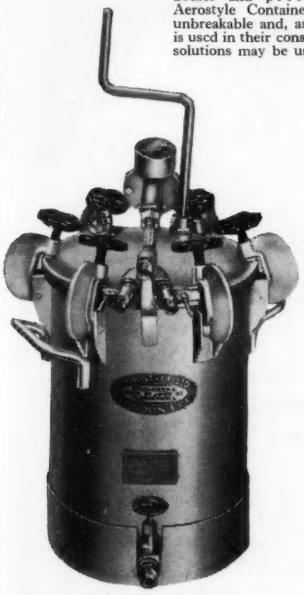
THOS PARSONS AND SONS LTD *ESTABLISHED* 1802

Head Office & Showrooms: 70 Grosvenor Street, London, W.1. Mayfair 7951 (10 lines)
BRANCHES: Beaconsfield, Birmingham, Brighton, Cardiff, Dublin, Edinburgh, Glasgow, Hanley, Leeds, Manchester, Newcastle-upon-Tyne, Nottingham, Plymouth and Southampton.

AEROSTYLE

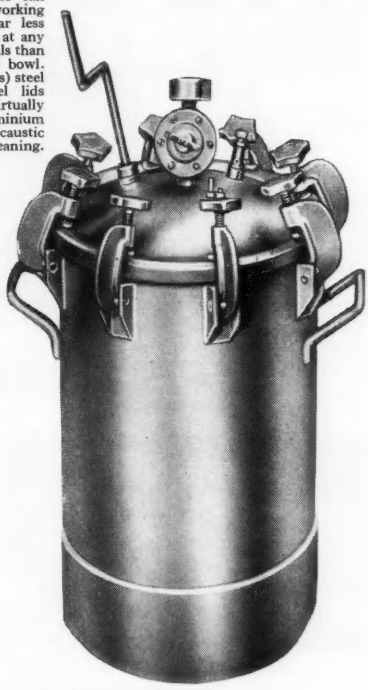
LIGHTWEIGHT PRESSURE FEED CONTAINERS

By using an Aerostyle Pressure Feed Paint Container the operator can now greatly increase his working speed and coverage with far less fatigue. He can also spray at any angle and use heavier materials than are possible with the cup or bowl. Having solid drawn (weldless) steel bodies and pressed steel lids Aerostyle Containers are virtually unbreakable and, as no aluminium is uscd in their construction, caustic solutions may be used for cleaning.



3-GALLON SIZE—weight 45 lbs. Popular lightweight designed for quick cover removal and easy access for cleaning. 1¼′ x 2′ 1″ high. Price £20. 8. 0d. Max. working pressure 60 p.s.i.

A
A
A
A
A
A
A
A
A
A
A
A
A
A
A



6-GALLON SIZE—Weight 70 lbs. Outlets for two operators top or bottom. Max. working pressure 80 p.s.i. 18½″ x 2′ 4″ high. Price £27 16. 6.

AEROSTYLE of ACTON

AEROSTYLE LTD., SUNBEAM ROAD, NORTH ACTON, N.W.10

Trouble with Hard Water..?

A pinch of SEQUESTROL may be the answer

SEQUESTROL (ethylene-diamine-tetra-acetic acid Geigy) inactivates calcium and magnesium in hard water so completely that it is, in effect, totally softened. SEQUESTROL derivatives are stable to prolonged boiling and high activity or alkalinity; they are thus invaluable in controlling water hardness in many washing, dyeing and photographic processes. Enquiries are welcomed.

THE GEIGY COMPANY LTD - Rhodes - Middleton - MANCHESTER

Geigy

Spray SALES APPEAL with the JGA

Industry's No.1 gun has EXTRA air-cap precision

Selling in today's market calls for tip-top finish . . . for *precision* spray-painting . . . the kind that can't be done with just any gun. For a gun to give the right pattern, speed and atomization from the first pull of the trigger, its air-cap and fluid-tip combination must suit the finishing material exactly. Equally important, it must give the same service continuously throughout the working day without the necessity of stopping to clean the air-cap every so often. Here's part of the reason for JGA supremacy! Write for *new* descriptive and technical leaflet to Dept. AE21

5 REASONS why DeVilbiss-Aerograph Air-Cap experience means Accelerated Production for you

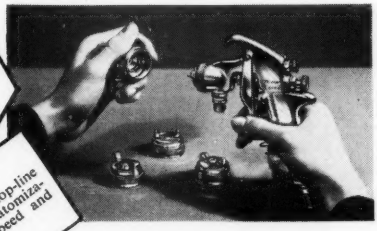
1. *Wide variety* of types and sizes ensures that just the right air-cap is available for every job you do.

2. *Design* of air-caps, fluid-tips etc. is closely integrated; each combination meets a specific set of requirements.

3. *Ball-and-cone principle* in design ensures correct alignment of air-cap and fluid-tip.

4. *Precise machining* of air-caps and fluid-tips ensures the extremely accurate and dependable performance of this gun.

5. *Experience* behind today's DeVilbiss-Aerograph air-caps covers every type of spray need, with *every* type of *material*, on *every* class of work.



NEW AIR CAP No. 78 for top-line performance . . . perfect atomization at even greater speed and freedom from build-up.

DEVILBISS AEROGRAPH

Sets the pace in spraying

The SYMBOL DV of SERVICE

The Aerograph Co. Ltd., Lower Sydenham, London, S.E.26. Tel: Sydenham 6060 (8 lines)

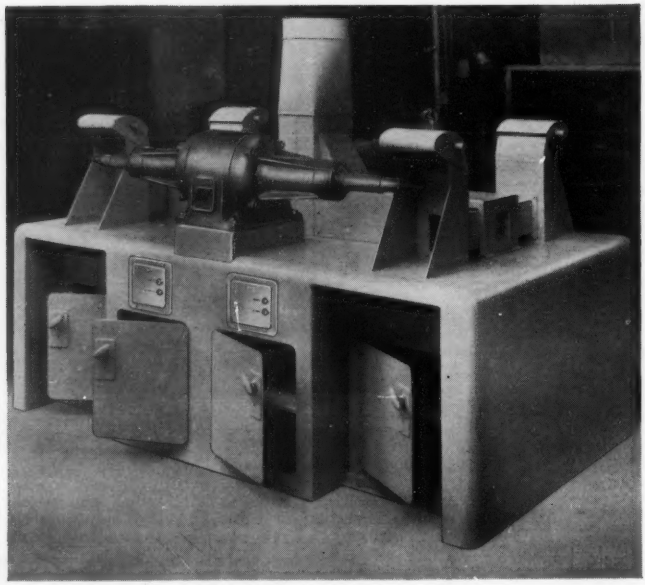
TA6935

A.E.GRIFFITHS (SMETHWICK) LTD. BOOTH ST, HANDSWORTH, BIRMINGHAM.

FIRST in DUST EXTRACTION

GRIFFITHS the SATISFACTORY PLANT

We design and manufacture dust extraction equipment in different forms and illustrate here one of many kinds of unit construction polishing benches we have installed. This unit, made of steel plate, has many features and advantages to commend it. The absence of ledges and sharp corners. The doors are flush to operators' cupboards. Motor starter panels are inset. All these small items add to safety and cleanliness. Note the robust construction of the hoods, easily adjusted in a matter of seconds to any desired position. This unit can be added to as required and will give a pleasing and effective layout to any polishing shop.



Telephone : Smethwick 1571-2-3-4-5. *Telegrams : Grifoven, Smethwick*

A.E.GRIFFITHS (SMETHWICK) LTD. BOOTH ST, HANDSWORTH, BIRMINGHAM.

EDITORIAL DIRECTOR:
DR. W. F. COXON,
M.Sc., F.R.I.C., M.Inst.F.

EDITOR:
A. F. KITSON

Published Monthly
by
ARROW PRESS LTD.,
157 Hagden Lane,
Watford, Herts.

DIRECTORS:
(CHAIRMAN)
L. H. STOCKWELL
(JOINT MANAGING)
W. F. COXON,
M.SC., PH.D., F.R.I.C.
MR. R. HARLEY, J.P.
(SECRETARY)
S. E. PARISH, A.S.A.A.

Price 2/6d. per copy.
30/- per year, payable in advance, which includes FREE issue of the Industrial Finishing Year Book.

INDUSTRIAL FINISHING

(Incorporating "CORROSION")

A monthly journal covering the whole range of finishing processes for wood, metals, plastics, etc.

AUGUST 1954

FEATURE ARTICLES

	Page
EDITORIAL	21
FLOCK FINISHES. By R. H. Warring...	22
NEW METHOD OF MAKING PLATING JIGS REDUCES PRODUCTION COSTS	29
CONTROLLED AIR CONDITIONING IN METAL FINISHING	31
REFINISHING REBUILT TYPEWRITERS	38
DESCALING AND PICKLING TITANIUM	43
NEAT GAS BURNER APPLICATIONS OF FINISHING INTEREST	60

MISCELLANEOUS

READER SERVICE CARD	*facing page* 68
PRODUCTION EXHIBITION	46
REFLECTION DENSITOMETER FOR COLOUR MEASUREMENT	57
RECENT DEVELOPMENTS	66
INDUSTRIAL ELECTRONICS	68
NAMES IN THE NEWS	70
ADVERTISERS' INDEX	74
CLASSIFIED ADVERTISEMENTS	74

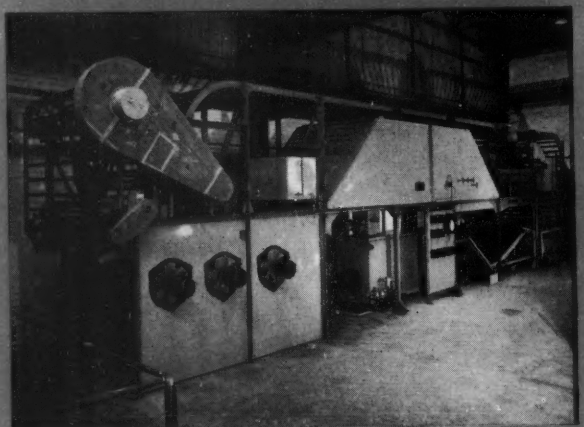
Copy and Blocks should be available to us by 20th of the preceding month.

They should be sent to:

INDUSTRIAL FINISHING
157 Hagden Lane, Watford, Herts.
Telephone: Gadebrook 2308/9

INDUSTRIAL OVENS

OF ALL TYPES AND SIZES



DESIGNED MANUFACTURED & SUPPLIED

24

BALLARD

THE NAME-CONVEYING-OVENS

F·J·BALLARD & CO. LTD. TIVIDALE TIPTON ENG.

Industrial Finishing

VOL. 7 AUGUST, 1954 NO. 74

"Fuel Efficiency"

IN December 1952, following on shortly after the Ridley Report reviewing the nation's fuel resources, Arrow Press Ltd.—the publishers of INDUSTRIAL FINISHING—decided to publish an all-fuel journal called *Fuel Economist*. Its editorial policy was to outline methods and means whereby fuel saving and fuel economy could be practised in industrial and commercial establishments in so far as all forms of fuel and energy were concerned.

Emerging firstly out of the Ridley Report and then the Report of the Pilkington Committee a new Company entitled the National Industrial Fuel Efficiency Service—N.I.F.E.S.—sponsored by the British Productivity Council, was set up. It took over the activities in the field of fuel efficiency previously carried out by the Ministry of Fuel and Power. The Ministry for many years had published a very useful and successful journal entitled *Fuel Efficiency News*, and with the formation and active operation of N.I.F.E.S. the Ministry decided to discontinue its publication.

Arrangements were made by Arrow Press Ltd. to rename their publication, *Fuel Economist*, giving it the title *Fuel Efficiency*, and it absorbs the circulation of *Fuel Efficiency News*. As from September 1954 *Fuel Efficiency* will, therefore, appear monthly, carrying news and views on efficient fuel usage—a problem in every industry—and it has already established a close liaison with the National Industrial Fuel Efficiency Service. There is no industrial or commercial establishment existing today which is not very much concerned with its fuel allocation and fuel price, so that this new publication must be of great interest to them.

Its circulation will be in excess of 7,000 and its coverage will be such that its readers include those industrial and commercial establishments which between them consume more than 80 per cent. of the total fuel used for such purposes, in Britain. Already a substantial list of important contributors has been arranged.

FLOCK FINISHES

by

R. H. WARRING

FLOCK has been produced from natural fibres and used for some hundreds of years. Hand-made flock papers were known as far back as the seventeenth century, imitating the effect of velvet and brocaded fabrics. Modern interest in decorative flock as applied to various surfaces is, however, only some twenty-five years old and only in very recent years has it come to be used on a particularly wide scale.

Apart from its obvious applications in novelty manufacture and display work, flocking is employed to cushion the turntables of gramophones, provide non-marring bases on lamps, bookends, etc., to produce "suede" interior finishes on furniture and motor-car hoods, silence car seat springs and aircraft interiors, in the manufacture of car floor carpets, and so on. Flocking is a simple and comparatively inexpensive process provided it is possible to recover the bulk of any overspray. It can be applied to any surface which will "take" a suitable adhesive and will also cover joints, surface defects or tool marks, etc., on the surface being coated.

Flock itself is made from fine fibres either natural or synthetic Currently the chief fibres used for the manufacture of flock are silk, cotton, wool, rayon and hair. These provide a suitable selection to meet a wide variety of requirements although it is highly probable that flock made from some of the modern synthetic fibres will also become available for specialised use. All types, except hair, are usually available in a wide range of colours.

Flock is produced either by grinding or cutting. The former process reduces the material to fine random shreds and ground flock, when applied, has a somewhat matted appearance, rather like felt. Ground flock is, in fact, used in the manufacture of imitation felt hats. Cut flock is chopped fibres, either precision cut to uniform length or random cut to a variety of lengths. Precision cut flock is very uniform both in diameter and length, ranging from very short, thin lengths to long, thicker pieces. Short lengths may be as small as ·015 in. and ·0005 in. diameter, whilst lengths in excess of half an inch are available in somewhat thicker diameters.

Probably most precision cut flock is of the silk or rayon fibre type. Cotton, wool and hair is more commonly random cut and then sorted by screening to remove undersize and oversize particles. All flock is normally sold by weight, one pound weight being equivalent to between three or four quarts volume with average sizes.

Silk, rayon, cotton and wool flocks are produced in a variety of colours, fastness to light, washing, rubbing, etc., being controllable to a certain degree. Other treatments may also be specified to render the flock mildew resistant or flame resistant. Natural hair fibres are employed in their natural colours and untreated, except for thorough washing and cleaning.

Cotton flock is widely used to produce a suede effect and as such is mainly employed for coating textiles and paper. The short nap makes it a suitable base for subsequent printing, as on decorated packages, etc. Rayon flock is rather more versatile and can be employed for both decorative and functional purposes. Silk is favoured for high-class decorative finishes. Wool, or more usually hair, is employed for carpet-type applications. A permanent "carpet" lining can be applied to the interior of a motor-car boot by flocking, for example, and

TABLE I. APPLICATION OF TYPICAL FLOCKS.

Type	*Application*	*Remarks*
Rayon or Silk.	Decorative Packages, etc. Radio Component Finishes (Cabinet interior, etc). "Textured" surfaces on novelties and toys. Soundproofing. Bases for Vases, etc. Decorative Surface Finishes.	Most versatile finish.
Cotton	Suede finishes on paper and fabrics. Imitation felt.	Short Nap.
Wool	Imitation Flock. Car hood interiors, etc.	Less widely used than cotton or rayon.
Glass Beads	Decorative work.	Sprayed as "Flock."
Hair	Carpets, underfelting, car interiors, etc. Imitation felt.	Mainly Goat's hair.

TABLE II. APPLICATION OF ADHESIVE.

Type of Product	*Method(s) of Application*
Mass Production (general)	Spray, dip, roller-coat
Mass Production (continuous)	Knife-edge, roller, dip, electrostatic
Small items	Dip, print
Novelty items	Silk screen, stencil, brush

even complete floor carpets for vehicles built up in the same manner. Goat hair is particularly favoured for this latter process on account of its good durability.

Flocking itself consists of two separate operations—application of the adhesive, followed by application of the flock. The choice of adhesive is very important for not only must this adhere firmly to the surface being coated but it must remain liquid or semi-liquid over a sufficient period so that when the flock is applied in the second operation it will penetrate the adhesive coating properly. The individual particles of flock resemble small spears and each has to be driven into the adhesive in an upright position, not flat. Being limp "spears" the presence of a film on the surface of the adhesive will deflect them, resulting in poor adhesion and a poor appearance.

Most adhesives employed are of the air-drying synthetic type which can be deposited in the form of a relatively heavy coat which stays soft long enough for a large area of flock to be applied. It is necessary to apply the adhesive over the whole of the surface to be coated and then follow up as quickly as possible with the flock. Jointing and overlapping of different areas is extremely difficult, due to the alternate use of both materials, and is never employed unless quite unavoidable.

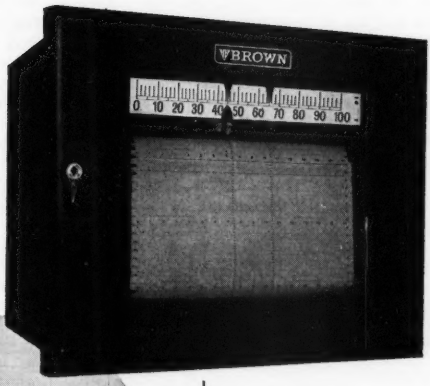
Obviously, too, the adhesive has to be suitable for the surface being

TABLE III. TYPICAL PROPERTIES OF FLOCK MATERIALS.

Property	*Rayon*	*Cotton*
Bulk (Flock)	3 to 4 qts. per lb.	3 to 4 qts. per lb.
Specific Gravity	1·5 to 1·52	1·53 to 1·55
Water Absorption	25 to 30 per cent.	24 to 27 per cent.
Ageing effect	Slight	Very slight
Heat resistance	Decomposes 350° to 400° F.	Yellows at 250° F. Decomposes at 300° F.
Resistance to Sunlight	Loses strength, little Discoloration.	Loses strength, Yellows
Effect of weak acids	Unaffected by cold acids.	Unaffected
Effect of strong acids	Attacked and decomposed.	Attacked and decomposed.
Effect of alkalis	Loss of strength	Little loss of strength
Resistance to mildew	Little*	Poor*

* Mildew proofing agent may be employed for enhanced resistance.

A COMPACT VERSATILE INSTRUMENT FOR ACCURATE MULTIPLE CONTROL



Brown Multi-Point *ElectroniK* Strip Chart Potentiometer Controller

AFFORDS multi-point recording with a great variety of controls at two different temperatures

PROVIDES proportional or contact types of control as required

POSSESSES all the features of the popular ElectroniK Potentiometer, including unmatched accuracy and sensitivity and automatic standardisation

HAS ample speed for stabilised records and control

CONSERVES panel space by combining many functions in one instrument

FOR full details of this model and its alternative control forms please write for Specification Sheet No. 189. Advice on *any* temperature control application is freely available from Honeywell-Brown Limited.

HONEYWELL-BROWN LTD

HONEYWELL-BROWN

1 WADSWORTH ROAD · PERIVALE · GREENFORD · MIDDLESEX

WORKS: Newhouse · Motherwell · Lanarkshire · Scotland

SALES OFFICES: London · Glasgow · Birmingham · Sheffield · Manchester

AFFILIATED COMPANIES: AMSTERDAM · BRUSSELS · FRANKFURT/MAIN · PARIS · STOCKHOLM · ZURICH

treated. No single adhesive will cover all possible flocking applications and so the adhesive type ultimately selected is usually one which is known to have a satisfactory performance with the surface in question. Also the adhesive is pigmented to match the colour of the flock being applied as this gives a far more even appearance than using transparent or "neutral" colour adhesive. The one exception to this rule is where a second application of flock in contrasting or harmonising colour is being applied over a first flock coating. A transparent adhesive is then normally used to bind the second flock coat in place.

The adhesive can be applied by any of the conventional methods. Spray painting is widely used for large numbers of irregular shaped objects, single large objects, etc. Brush, dip, roller, etc., are alternative methods which may fit in better with particular production runs. Continuous lengths of fabric or paper are commonly coated by passing over rollers and fabrics by means of a blade. The three most widely used methods of applying subsequent flock coating are then by spray, vibration or electrostatic attraction.

In flock spraying a conventional form of gun is employed, with the exception that the orifice in the nozzle is quite large to pass the fibres. Then flock, of course, is not atomised by the gun but merely separated into individual particles and projected outwards with considerable velocity. Using moderate air pressures (of the order of 20 lb. per sq. in.), the gun is held rather farther from the work than in normal spray painting (about 18 in.). This gives the individual particles of flock time to align themselves upright to penetrate the adhesive end-on, and also reduces the drying effect of the air blast which might otherwise tend to produce premature "filming" of the adhesive. The flock is applied in sweeping strokes, as in normal spray painting.

The amount of flock which can be loaded into the container of a normal gun is seldom more than about a quart. For continuous production work the flock is frequently supplied to the gun from a pressurised container. The container is fitted with an air distributing head which circulates air throughout the container to agitate the flock and direct it into the exit hose, thus delivering a controlled volume of flock to the gun. The air control is the spray gun trigger. When the trigger is pulled, air is admitted to the tank, delivering flock to the gun. A separate air line to the gun provides the spraying stream. Pulling back the spray gun trigger still further shuts off the flock delivery and gives an air blast only from the gun which can be used to blow off excess flock. Slightly higher air pressures are normally required for this class of work (25 to 40 lb. per sq. in.), air consumption of a typical unit being 8 c. ft./min. It should also be noted that in all spray applications clean, dry air must be employed since damp air would cause the flock particles

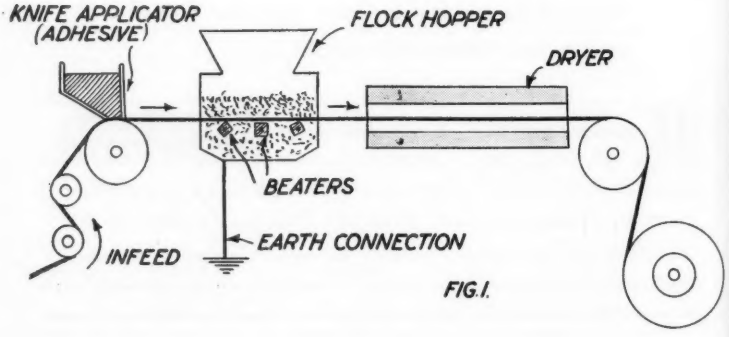


FIG. I.

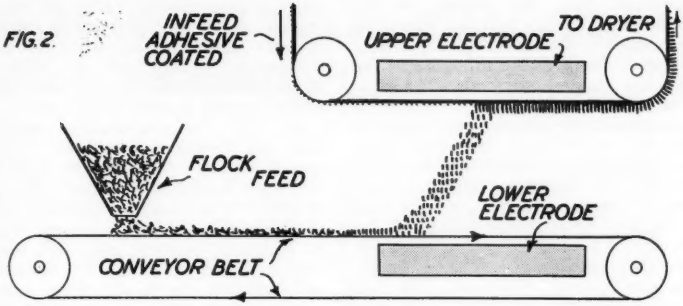


FIG. 2.

to "ball" instead of "spear."

For semi-permanent flock applications (e.g., seasonal or temporary decorative work), adhesive and flock can be sprayed simultaneously. In this case two guns are held by the operator, one delivering flock and the other adhesive. The two streams are directed to merge about two or three inches above the surface of the work. The flock is thus rendered tacky before striking the work surface and further secured by the simultaneous flow of adhesive overspray also reaching the work surface. Very thick build-ups can be attempted in this manner but the resulting flock coating is not bound, and, therefore, not as durable as a similar coating applied by conventional methods. The appearance of the flock is also more matted.

By contrast, one of the faults which may be experienced with conventional two-stage flock spray coating is following up with the flock spray *too* quickly after spraying on the adhesive. If the overspray from the adhesive coating has not dispersed the flock will have to pass through an atmosphere saturated with adhesive, become wetted in the process and given an unsatisfactory coating.

The vibration method of flock coating, illustrated in Fig. 1, is particularly adaptable to coating flat stock-paper, textiles, etc. The basic material is passed through the coating stages with a continuous motion. Adhesive is applied at the beginning of the coating stage by roller, knife or any other suitable means adaptable to continuous flow. The coated material then passes through a flocking chamber which is fed with flock via a hopper. Square or hexagonal section "rollers" support the material and at the same time give it a vibratory motion on account of their cross section. This also vibrates the flock fibres showered on to the adhesive coated surface, which has two effects. Vibration assists penetration of the fibres into the adhesive and also charges them with static electricity, causing each individual particle to stand on end. It is essential that the flocking chamber itself be properly earthed to realise the benefits of electrostatic repulsion, and also to prevent the build-up of dangerously high electrostatic charges within the chamber which might spark and ignite inflammable solvent vapours.

Electrostatic Method.

The electrostatic method is equally simple in operation Fig. 2. Here two electrodes are used with a high potential difference between them. Encircling the lower electrode is an endless conveyor belt on to which flock is loaded. A uni-directional conveyor system, or continuous feed system, then carries the base material to be coated in the same direction as the flock flow but immediately under the upper electrode. A suitable adhesive coating is applied to this material at some convenient initial stage.

As soon as the flock particles are conveyed into the region of the electrostatic field between the two electrodes each individual fibre becomes charged and attracted to the opposite (upper) electrode. The electrostatic effect is actually realised in two stages. On entering the fringe of the electrostatic field, individual fibres are charged like small magnets and, by mutual repulsion, tend to stand erect. Conveyed in this attitude into a stronger field they are shot across to the upper electrode, maintaining their vertical attitude. Before reaching the second electrode they are intercepted by the adhesive coated base material. Extremely dense, uniform coatings are possible with this technique, it being possible to deposit flock coatings with a density in excess of 250,000 fibres per sq. in. of surface. Controlling factors are the respective rates of flow and the strength of the electrostatic field, i.e., electrode potential and electrode spacing. One external factor of major importance is the relative humidity of the ambient atmosphere. For satisfactory results with the electrostatic method this has to be controlled within recommended limits.

In both the electrostatic method and the vibration method "overspray" or flock wastage in application is minimised. After drying, however, it is common practice with all methods to remove excess flock by brushing, blowing, etc. Such flock recovered can normally be salvaged and returned to stock. With spray application of flock the spraying can often be done in a reclaiming booth where overspray is automatically drawn off and collected. Spraying without any form of air extraction plant, overspray quickly collects on the floor and again may be collected, provided reasonable precautions are taken to prevent soiling.

GERMAN CHEMICAL APPARATUS AND EQUIPMENT CONGRESS AND EXHIBITION, 1955

INVITATIONS to the ACHEMA XI —Chemical Apparatus and Equipment Congress and Exhibition—to be held in Frankfurt-am-Main during the period 14th to 22nd May, 1955, are now being issued. An eight-page pamphlet gives a preview of the series of functions that the DECHEMA—Deutsche Gesellschaft für chemisches Apparatewesen—is arranging.

Over 600 firms from twelve different countries will exhibit. Many thousands of units of machinery, apparatus, equipment and complete plant, representative of all branches of chemical engineering, regulating and control equipment, constructional materials and laboratory equipment for all the varied fields of chemical research, will be on show in eleven exhibition halls of a total floor space of 46,000 sq. metres.

The "ACHEMA Congress City," which will be established in the Exhibition Grounds of the City of Frankfurt-am-Main, will include, in addition to the eleven exhibition halls previously mentioned, the Congress House, the Reception Hall, the Foreigners' Club and the "Dechema Haus." All these will have a total floor area of no less than 210,000 sq. metres.

The 1955 Congress of the European Federation for Chemical Engineering will be held in conjunction with the ACHEMA XI Congress together with the active co-operation of the nineteen technical and scientific societies, representing eleven different countries, that form the European Federation for Chemical Engineering.

In addition to Plenary and Special Lectures, it is proposed to make a series of Works Visits. The Plenary Lectures will be delivered in the Congress Hall, a building that can seat an audience of more than 2,000 persons.

The series of special lectures for students from technical universities and colleges, both at home and abroad, will again be delivered.

The ACHEMA Year Book for 1953-55 will appear in the autumn of this year, and will also be issued as a European Catalogue of Chemical Apparatus and Equipment, in English, French and German. The price of this book is included in the Congress Fees.

A copy of the invitation pamphlet, in English will be sent free of charge upon application to the DECHEMA—Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt-am-Main, W. 13, Postfach.

New Method of Making Plating Jigs Reduces Production Costs

WHAT an excellent idea. How simple, how effective. But why didn't someone think of it before? Such is the barrage of exclamations that usually accompany the appearance on the market of patented new products, whether they be for domestic or industrial use.

It is for this reason that INDUSTRIAL FINISHING turns its spotlight on the story and man of the month. In the limelight of the finishing world is John Preston and his revolutionary method of making plating jigs. The idea is really so simple and effective that we cannot imagine why indeed it was not thought of before.

But infinitely more important is the claim that this method reduces production costs to such an extent that jigs can in some cases be marketed at a price approximately 50 per cent. of past prices. What is more, they incorporate a number of distinct advantages over other types.

For a full appreciation of these facts a description of the universal method and the one adopted by John Preston and Co. Ltd., is perhaps necessary. Throughout the industry it has been customary practice for many years to drill holes in the spine of the jig at the specified distances, insert the wire and solder it into position. The spines are usually of copper or brass. This process, carried out by skilled workers, expends solder, oxy-acetylene, various abrasive materials and, of course, considerable labour.

In the Preston system the metal Duralumin is used as the spine. The wire forms are *spring loaded* on to the jig, thus obviating drilling and soldering.

In both systems the completed jigs are insulated in the normal way with stopping-off material.

Consequently, it is claimed a very considerable saving is made in costs of labour plus an added saving in basic materials.

The advantages claimed in design are:

1. *Lightness*—the Preston jig being a third of the weight of jigs of comparable size.
2. *Higher conductivity* of Duralumin over brass.
3. *Wires cannot loosen*—a prevalent fault in a number of existing types of jig.
4. *No soft wire* caused by over-heating when brazing or soldering.

John Preston—salesman, soldier, business man

5. *Longer life* because spines are not weakened by re-drilling. When replacing wires, the original holes are slightly enlarged.
6. *Simplified maintenance.* Easier and cheaper repair services.

This idea was born of continual experimentation coupled with an appreciation tion of the requirements of the ever-expanding plating industry. With increasing competition, too, the company was anxious to produce a cheaper article, not only of equal, but improved standard.

This is perhaps indicative of the business acumen and mechanical ability of the man behind the idea. The picture which emerges from our interview is of a tall, powerfully built Lancastrian of 39 (at one time a formidable opponent in the forward line of Lancashire's Rugby XV), a 2 handicap golfer, and now a keen horseman with two show jumpers, who in his varied life has been salesman, soldier and business man in that order.

When only eighteen he tramped the streets of Burnley weighed down with a bag full of food samples and a thousand

and one small retailers before him. He did well too, for soon after his twenty-first birthday he was appointed chief representative in the Cheshire area.

World War II loomed up, however, and in 1940 John Preston joined the Royal Tank Corps. Two years later he was Commissioned in the Queen's Own Cameron Highlanders, serving for the next five years with the famous 51st Highland Division in the major theatres of the war in the Near East and Europe. He was released in 1946, not entirely unscathed, with the rank of Major and joined the sales staff of Acton Bolt Ltd.

Two years later he left to start the Company which now bears his name. From a nucleus of four enthusiasts in 1948, John Preston and Co. Ltd., expanded rapidly and today employs 120 men and women.

Jig making is a comparatively new industry in this country. John Preston and Co. Ltd., were, in fact, among the first to explore the field. Today they claim to be the biggest Company in the world devoted to jig manufacture.

Footnote: Everything American is not necessarily everything big. The biggest jig makers in the U.S.A. employ less than half the number now at work on the new Preston jig at Stanley Street, South Acton, England.

B. J. ROUND'S NEW PLATING SHOP

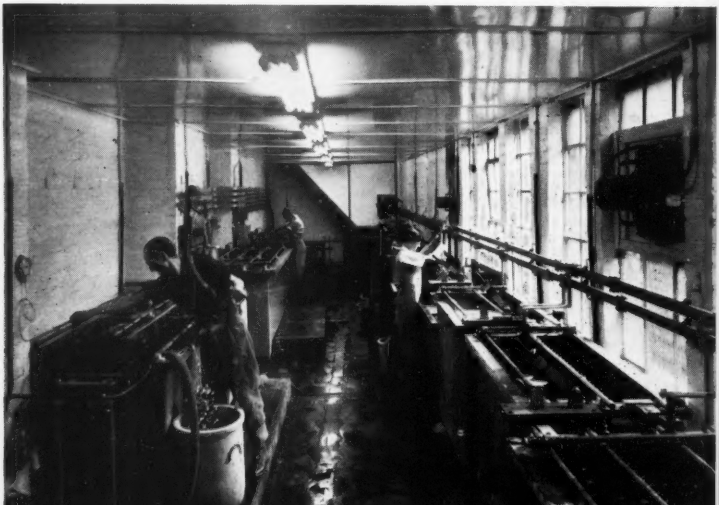
B. J. ROUND AND SONS LTD., 8 Northampton Street, Birmingham 18, have announced the addition of a new nickel plating installation which, they claim, will virtually double their production capacity in this section.

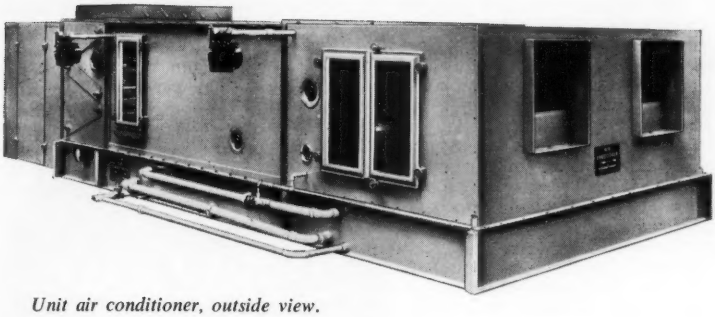
Equipped with modern plant and machinery, the shop is 120 ft. long. The walls and ceiling are painted white enamel and the false ceiling conceals the electric wiring and plumbing.

The capacity of its nickel vats is 3,000 gal., and the weight of anodes in them 2,100 lb. The low tension current provide 4,000 amp. for the nickel solutions, and 1,000 amp. for the metal cleaning plant of 1,000 gal. The vats are of solid steel, rubber lined, and all solutions are heated by the latest type of electric immersion heaters.

This plant can cope with articles up to 30 in. dia. and lengths up to 8 ft. 6 in. The solutions used include both the "heavy deposit type" to the latest "bright deposit type," and can deposit nickel at the rate of 0·003 in. per hour. One vat is designed to nickel plate fashion jewellery at the rate of 1,000 gross per week.

Below: B. J. Round's new nickel plating installation. The nickel vat capacity is 3,000 gallons. Solutions used include "heavy" and "bright deposit" types. Walls and ceiling of the shop are in white enamel.





Unit air conditioner, outside view.

Controlled Air Conditioning in Metal Finishing

SPECIALLY CONTRIBUTED

CONSIDERABLE accuracy must be maintained at many stages in the quality production of a variety of components, and particularly in connection with those for precision mechanisms, since the tolerances on many dimensions are extremely small. Many problems must be overcome in achieving consistent dimensional standards. Prominent amongst such problems are those associated with fluctuating temperatures, and the presence of air-borne dust and moisture.

The need for a clean working atmosphere for the assembly of precision products requiring fine surface finish will be obvious. Wide variation of room temperatures makes it more difficult to fit precision components, and humid conditions in store rooms and assembly shops result in the corrosion of valuable material. Controlled air conditioning systems provide the solution to these problems.

Air Cleaning is essential

Where the quantity production and finishing of precision metal parts is undertaken in clean surroundings, remote from chimneys and other sources of contamination, the usual precautions taken to maintain general cleanliness ensures a satisfactory working atmosphere. Should these conditions be unobtainable, air filters must be incorporated in the ventilating or space heating systems so that only clean air can enter the working area. All-metal filters are available for this purpose, and where precious metals are machined or finished, expendable filter sheets can be employed, the accumulation of metal dust being recovered from the ash, when the sheets are subsequently burnt. This practice is adopted for instance by some makers of fountain pen nibs and gold spectacle frames. An air washer wherein fine water sprays remove all dirt particles from the incoming air, provides an even cleaner atmosphere, and is usually incorporated in an air conditioning system. Any apparatus for humidifying and de-humidifying air also exerts a cleansing action, apart from the purification achieved in the main air-washing chamber.

Constant Room Temperature

The maintenance of a uniform air temperature is secondary in importance only to cleanliness. For any type of modern air conditioning equipment automatic temperature control is essential if the best conditions are to be provided.

The most elementary method of room-temperature maintenance involves manual regulation of radiator valves and air inlet dampers, combined with some form of control for the boiler, when steam is the heating medium. A more elaborate system provides for the remote control of the valves and dampers by compressed air devices operated from a central control panel.

Correct and uniform air temperatures can only be ensured, however, when thermostats are installed in each work-space. These instruments may be of the self-contained type, directly connected to the control valves of the radiators, unit heaters, or heating pipes, or they are electrically or pneumatically operated.

Existing warm-air heating systems can frequently be rendered more efficient by the provision of automatic damper control. Excessively warm air is then exhausted from the factory space, or warmed air is admitted if the temperature falls below the desired value.

Humidity Control

The importance of the correct relative humidity within the work-space nas already been stressed, and automatic humidity control should also be maintained in store-rooms if the corrosion of metal parts is to be prevented. Cooling of the air below its "dewpoint" temperature must be avoided, and this can only be ensured by combined temperature and humidity control, provided by modern air conditioning plants. Various electrically-operated humidity controllers are available, whereby motorised valves and regulators can be adjusted to suit the humidity prevailing in the surrounding atmosphere.

In many factories, the maintenance of the room temperature and the provision of adequate ventilation are the only matters which receive attention. Where a large percentage of operators is seated, a minimum temperature of 60° F is recommended and, in general, the moisture content of the air should not exceed 70 per cent. of the saturation value at any particular temperature. Higher humidity will cause discomfort to the operators, apart from the injurious effects on the work.

Although some systems of combined heating and ventilating ensure atmosphere which approximate to those provided by air conditioning, it must be emphasised that maximum efficiency can only be expected when the manufacture of precision parts is undertaken in a uniform, fully-controlled atmosphere. Such an atmosphere can only be provided by a controlled air-conditioning installation.

Modern Air Conditioning

The basic elements of any type of air conditioning system is illustrated diagrammatically in Fig. 1. The

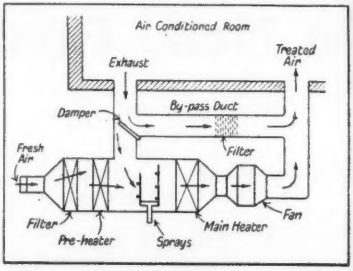


Fig. 1. Elements of air conditioning installation

system consists of sections for filtering, pre-heating or pre-cooling, washing, re-heating or re-cooling, and means for air distribution. Two main types of air conditioning installations are available, namely centralised plants and self-contained units. In both types the air passes through the sections described above, and is finally distributed through suitable ducting. Central air conditioning plants are more suitable for new factories, and large workshops, whereas the self-contained unit air conditioner types can often be usefully substituted for obsolete heating and ventilating systems. The various elements can be arranged in many different combinations, and some of the alternatives more commonly employed will now be discussed.

QUALITY *plus*

+ A technical advisory Service fully competent to advise on every aspect of material application and processing.
+ Continuous research and development.
+ 181 years of experience

MANDER'S Industrial Finishes

MANDER BROTHERS LTD. WOLVERHAMPTON

INDUSTRIAL SALES AND TECHNICAL SERVICE DEPARTMENT

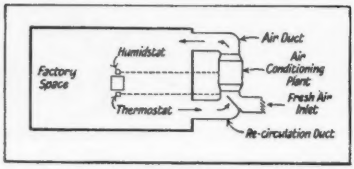


Fig. 2. Air recirculation applied

The majority of air-conditioning plants recirculate part of the air from the conditioned space. This air is often filtered and re-heated, a re-circulation arrangement frequently adopted being shown in Fig. 2. With this method, the size of the plant can be considerably reduced, with economies in the initial cost, and in the consumption of fuel and power. The advisability of complete or partial recirculation of air from the conditioned space depends on individual conditions, and principally on the quality of the return-air, which should be free from odours and not unduly low in oxygen content.

In Fig. 3 is shown the lay-out of a centralised air conditioning plant, with provision for optional re-circulation, the return air being reheated and then mixed with fresh, incoming air. This lay-out embodies all the units of a complete air conditioning system. Two slowly rotating fans are employed, the fan A blowing the treated air through ducts into the work-space and the fan B withdrawing the used air and passing it either to exhaust, or to the return duct C. An air damper D permits adjustment of the proportions of air exhausted and returned. Fresh air enters the system through louvres, is mixed with the return air, filtered, and pre-heated. Passing into the adjacent washing chamber, the air is again cleaned, and either moistened by a warm-water spray, or partially dried by a cold spray. Eliminator and scrubbing plates remove excess moisture, and a re-heater raises the temperature of the treated air to the desired value, before it is pumped into the ducting by the fan A. The air temperature and humidity are remotely controlled by instruments disposed throughout the various departments of the factory.

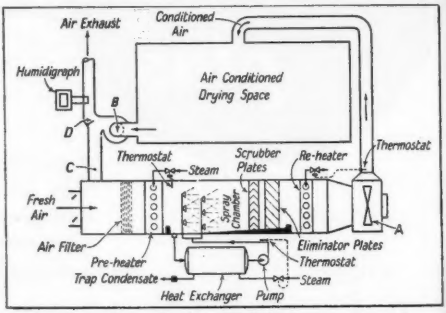


Fig. 3. Central air conditioning system for controlled temperature and humidity, with filtered air supplied to factory space

Unit Air Conditioners. (Fig. 4)

Self-contained air conditioning units suitable for treating air to a single

(*Continued on page* 36.)

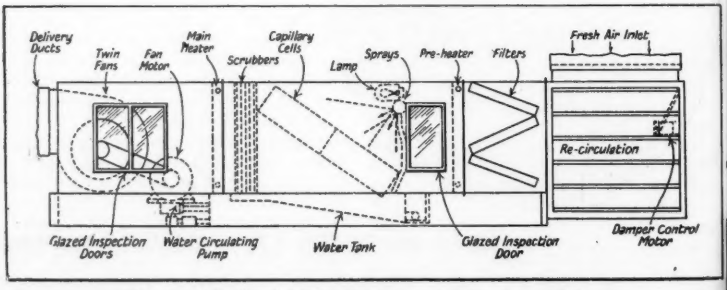


Fig. 4. Details of horizontal type of unit air conditioner

EXCELCLEAN

For Hot Cleaning of Steel, Brass, Copper, Britannia Metal, Tin and its alloys, Zinc and Aluminium.

CLEANIT

A specially compounded Salt for Hot Alkali Cleaning of Steel, Brass, Zinc and Aluminium. Can be employed with, or without, Electric Current, except for Aluminium.

ALKLEAN

A specially compounded Cleaning Salt, manufactured particularly for Cleaning Aluminium articles. The Salts are readily soluble in water and are used without current.

STIROCLEAN

This cleaner is a carefully balanced mixture of chemical salts, especially designed for rapid heavy duty cleaning of Iron and Steel components. Cleaning can be carried out with or without the use of Electric Current.

ROCOLENE

An extremely efficient Cold Cleaner Salt used for the final cleaning of Steel, Brass, Copper and Copper Nickel Alloys immediately prior to plating.

R. CRUICKSHANK LTD
CAMDEN STREET, BIRMINGHAM, 1
Phone: CENtral 8553 (6 lines)
Grams: Cruickshank, Birmingham

W/C 2039

(*Continued from page* 34.)

factory department, have now become very popular. These units, which are compact and inexpensive to install, control both temperature and humidity. The various elements of a typical air conditioning unit may be seen in Fig. 4. Some unit air conditioners are made in two sections, one containing the cooling compressor, condenser, and auxiliary equipment, and the other the air-cooling coils, filters, and motor-driven fans.

Local fluctuations of air temperature and humidity, or the presence of air-borne dust, can usually be remedied by the provision of one or more of these air conditioning units, which possess considerable adaptability as regards both method or installation, and output. Such units can be mounted within a room, for example, suspended from the ceiling, or installed in a small adjoining room, or outside the wall of the building. Short ducts convey the treated air, which is dispersed through specially designed diffusers.

BIBLIOGRAPHY

E. A. Murphy. *Assembly Line Methods Combined with Laboratory Accuracy, at Hamilton Watch Co. Plant Instrumentation*, Minneapolis-Honeywell Regulator Co., U.S.A.

Faber and Kell. *Heating, Ventilation and Air Conditioning*, Architectural Press, London.

Industrial Air Conditioning Practice, Keeney Publication Co., Chicago, U.S.A.

Dr. W. A. Kirkby. *Space Heating in Workshops*. British Iron and Steel Research Association.

Leo Walter. *Air Conditioning Plants and their Automatic Control*. The Air Treatment Engineer, March-April, 1949.

M. C. Marsh. *Humidity in Industry*. Journal of Heating and Ventilating Engineers. December, 1936.

ALL-BRITISH EXHIBITION IN DENMARK

A BRITISH trade fair and exhibition will be held at Copenhagen from Thursday 29th September, to Sunday 16th October, 1955. His Majesty the King and Her Majesty the Queen of Denmark have graciously agreed to grant their patronage to the exhibition, which will also have the full support of the British and Danish Governments. It will be organised by the British Import Union of Denmark in collaboration with the Federation of British Industries.

The exhibition will be held in Copenhagen's Tivoli Gardens and in the Forum, where the existing buildings will be supplemented by British made temporary structures. Mr. John Lansdell, F.R.S.A., M.S.I.A., has been appointed co-ordinating designer, assisted by two Danish architects, Mr. Simon Henningsen (for the Tivoli Gardens) and Mr. O. Gundlach-Pedersen (for the Forum). In addition to the trade exhibits, plans are being made for spectacular British attractions to be staged in Copenhagen during the period of the exhibition.

The Federation of British Industries is making available the services of its subsidiary company, British Overseas Fairs Ltd., 21 Tothill Street, S.W.1, which was formed last year to run the British Trade Fair at Baghdad. Mr. D. A. Lamb, the company's Exhibition Organiser, will be manager of the Copenhagen Trade Fair and Exhibition, with a Danish assistant, and the company will be responsible for all arrangements in the United Kingdom.

M.o.S. PAINT SPECIFICATIONS

MINISTRY OF SUPPLY specifications and amendments will, in future, be announced some months before they come effective. Paints may be submitted to the specifications which are to be superseded until the new specifications become operative, but on and after the operative date no further supplies will be inspected to the cancelled specifications. This long period of notice was fixed so that approval samples could be submitted before the operative date of a specification and posible production difficulties might be avoided.

Thus C.S.2226.A, Paint, finishing heat-resisting, stoving, will supersede C.S.2226 on 1st September.

The following D.E.F. Specifications are now on sale at H.M. Stationery Office: D.E.F. 1096; Paint, finishing, general service, gloss, stoving: D.E.F. 1099; Paint, aluminium, for metal. These supersede C.S.2661.A and C.S.2718 respectively. Inspection to material covered by C.S.2661.A and C.S.2718 will cease at a date to be announced.

German Plastics Fair.—The date for Plastics, 1955, Trade Fair and Production Exhibition of German Industry, has now been definitely fixed for 8th October to 16th October, 1955. It is to be held at Düsseldorf.

Hot Spray painting offers tremendous advantages in industrial finishing. Whatever your product — washing machines, typewriters, cycles, safes—the use of the preheated paints speeds up production and saves time and labour. For many products, too, it gives a better finish at lower cost.

There is a full choice of finishes. John Hall's of Bristol can supply air-drying and stoving enamels, polychromatics, wrinkle and hammer finishes as well as cellulose lacquers, enamels and fillers . . . all suitable for application by Hot Spray plant.

Free 'test finish' and advice

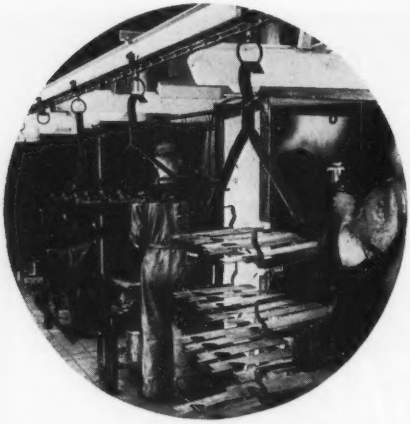
If you would like to know exactly how Hot Spray painting can simplify your finishing problems, why not send us one of your products for an expert "test finish" and opinion? If the Hot Spray process is suitable for your product, we will show you how best to use it. If it is *not* suitable we may be able to save you expensive "trial and error". The process requires experience and knowledge to obtain the best results . . . as specialist manufacturers of industrial finishes we have the *know-how*, which we gladly place at your disposal.

For full particulars write today to:

Demonstration Centre

JOHN HALL

JOHN HALL AND SONS (BRISTOL AND LONDON), LTD., HENGROVE, BRISTOL 4



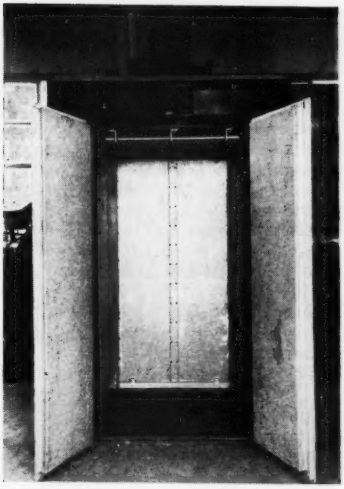
Refinishing Rebuilt Typewriters

In 1930 two business-men launched a new company with the aim of unifying and standardising the rebuilt typewriter trade. Their object was to produce a finished article that would be thoroughly dependable, efficient and capable of long service, in contrast to many at that time being turned out by second-hand typewriter firms. Today the trade name "Criterion" is a symbol of reliability in the business world.

THE great majority of these machines were formerly purchased from the States. Today, however, quite a number of them are purchased from home markets, and most of them are already in fairly good condition, even before they are stripped down for re-enamelling and plating. It might even appear that in many cases all that is required is a good chemical clean and a new keyboard, and the typewriter would be ready once again for a long period of service. But that would not meet the requirements of the "Criterion" rebuilt model. Every machine must first be dismantled and completely stripped down to the base casting, and all essential working parts are replaced from new stock on each fully reconditioned model. All plated parts are scrutinised by the mechanic and all parts revealing signs of wear are immediately rejected and replaced with new stock. All the good plated pieces which have passed this first inspection are placed in a container, together with name and number of machine, and are then despatched to the plating department for refinishing. Sometimes a number of typewriters are delivered to the refinishing shops that have been badly damaged by fire and water, or possibly a machine has been carelessly used and neglected and scarcely any one part of the mechanism works effectively. In many cases the enamel finish on the base and other painted surfaces will be found in damaged condition, and the complete machine will need to be stripped down and completely rebuilt. In this case, the top plate, side panels and other enamelled parts are sent with the base to the enamelling department. The first step towards the refinishing of the base and acces-

Top left: Operators spraying "Imperial" typewriter parts before being traversed into the conveyor oven Below: A "Criterion" super grade rebuilt

sories is to get the old enamel removed. There are two methods of doing this, both of which have certain advantages according to the kind of finish the base is to receive. One method is to dip the complete casting into a solution worked hot, rinse in clean water and allow to dry, and then remove the enamel from the surface by scurfing. These scurfs are easily and speedily made up in any polishing shop, and they serve a useful purpose as a means of paint removal from any metal surface. The second method is to immerse the base and other enamelled parts that go with it into a paint-stripping solution maintained at a temperature of about 185° F. From this stage the workpieces are processed as any new machine from the original manufacturers. The base and parts are left in this solution until all the enamel is removed from the metal. The stripping operation is followed by a hot rinse and then oven-dried. While this is being done the parts to be replated are already being polished prior to refinishing in nickel or chrome as the case may be. When both the enamelled base and plated parts are finished they are then sent to the workshop and assembled as "Criterion" rebuilt models.



Combined steam and electrically heated air circulated batch type drying oven as used by the author

Details of Treatment

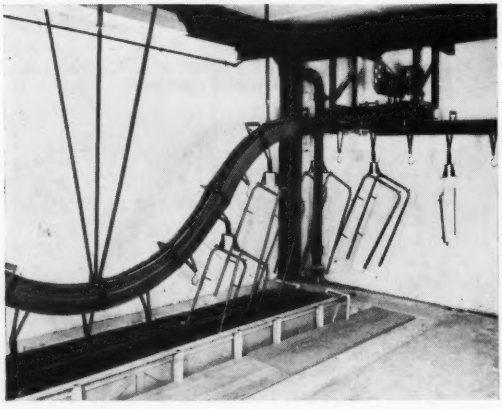
The iron and steel parts are first treated for rust prevention. There are several methods of doing this, but perhaps the now popular Bonderizing technique is the best known. The parts are first degreased in a vapour tank of trichlorethylene solvent. The vapour condenses on the parts and every trace of contaminant is effectively removed. From here the workpieces are placed in the Bonderizing tank for only a few minutes before they receive a double hot water rinse and a final immersion in a sealer dip. The resultant deposit imparts the ideal key for the application of a paint. Aluminium is also used a great deal in modern machines, and the surface treatment for this is known as Pyluminizing. This enables subsequent paintwork to be carried out with every degree of success. If the quantity of work to be dealt with does not demand the

Right, below: Remington De Luxe noiseless with popular wrinkle finish. Left: Imperial "Good Companion" Model T. portable

recognised Bonderite treatment, an alternative method is sometimes found in passing the iron and steel parts through a "Jenolite" dip. This imparts to the article a rustproof coating, and after drying off in the oven the parts are then ready for first coating. Yet another method of treating the typewriter frames and other parts to be enamelled is to prepare the surface of the metal with abrasive paper, and after removing any dust, applying direct to the prepared surface a red lead primer and oven-baking for half an hour at about 300° F. This latter technique may take up more time, but it is effective and is readily adapted to occasional and small production.

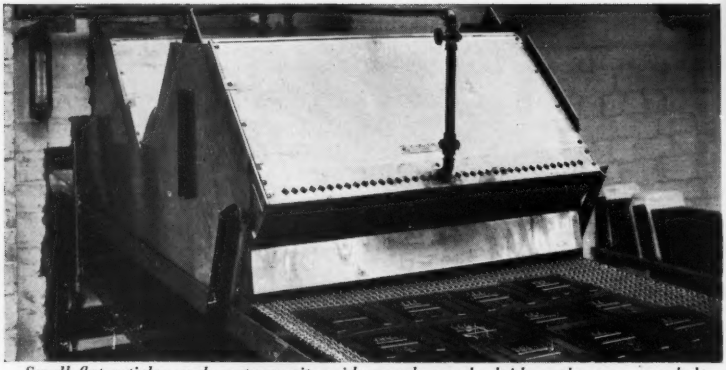
The next stage in the processing of the rebuilt typewriter is the application of a black undercoating to the base and parts. Where the bases are to be finished in glossy black this initial coating of dull black is absolutely necessary to a first class finish. But if the typewriter is to be coated with the wrinkle texture this is not thought to be so necessary, because the material can be applied to the metal direct, and it is generally considered to be a one-coat enamel. But for the best class of work the writer believes an undercoating is more than desirable. For many years the paint manufacturers had been experimenting with the idea of a one-coat enamel which would eliminate all stopping and pretreatment of castings. The former conventional technique of treating typewriter bases was long, tedious and expensive. Some years before the wrinkle enamel was put on the market as a commercial proposition the writer was engaged on experimental work with several new paint formulations, one of which happened to be this very "wrinkle" or "shrivel" with which this article deals. At that time, however, it was an almost unknown quantity. No-one knew just how the work would appear when removed from the oven and the texture was not easily controlled. Often, when the parts were examined, the wrinkle formations differed completely over the face of the whole workpiece. Today, however, the operator merely sprays the paint material over the surface, places the parts in the oven and the hot vapour does the rest. After a specified stoving time at a predetermined temperature the articles are taken from the oven and the wrinkle finish is found to be perfectly uniform in appearance and pleasing to the eye. After considerable experimental work with different types of oven and varying temperatures and conditions, a measure of success was attained, and a large number of typewriter parts such as top plates, front castings and side panels were finished with the new wrinkle enamel, while the remainder of the enamelled parts were finished in the conventional glossy black.

When the machines were finally assembled they looked very attractive in their new colour scheme and several were put on exhibition in the London showrooms. *The result was an immediate success.* The new type of finish took on beyond all expecta-



Conveyorised articles being dip coated. A similar technique was adopted by the author for the fininshing of 'Criterion" typewriter parts

ARTILLERY WORKS, BIRMINGHAM 9. | TELEPHONE: VICTORIA 0403
TELEGRAMS: TOUGHNESS, BIRMINGHAM.



Small flat articles such as typewriter side panels can be laid on the conveyor belt as illustrated and traversed into gas-heated chamber

tions. The wrinkle-finished panels became a major selling point. There were many telephone and personal enquiries about the nature of the new material and the enamellists were quick to see its possibilities with its wider application to other branches of office equipment and other trades. Within a very short time the enamelling department of the "Criterion" rebuilt company was applying this same finish in several different colours to adding machines, duplicators, racks, filing cabinets and almost everything that comes within the province of office equipment. Today, of course, it is difficult to discover any manufactured article from thimbles to motor-cars where the wrinkle finish is not in evidence. A clear proof of the growing popularity and versatility of this now well-established paint material for industrial finishing.

Applying the Crackle Finish

The best and more permanent results are obtained when the enamel application is made soon after the phosphating process. The non-greasy rust-inhibiting surface formed imparts the ideal key for bonding the paint coating to the metal surface. The black undercoating having been applied to the base and other parts to be enamelled, the workpieces are now ready to receive the final coat of wrinkle. In the majority of cases, of course, the typewriter base and parts are finished in black wrinkle. But as already stated, almost any colour scheme can be evolved and designs are sometimes carried out according to the customer's own wishes. The enameller applies the paint material with the ordinary industrial air gun at a pressure of about 45 p.s.i. This peculiar wrinkle formation which appears on the finished article is the result of the incorporation of tung oil in the paint composition. It possesses characteristic peculiarities at different stages of its processing, both in its relation to initial pretreatment during formulation as well as during the actual baking of the paint material.

The enamelling shop is laid out to deal with all types of typewriter parts and all racks and jigs are constructed specifically for typewriter work. In the large typewriter finishing shops where the work is conducted on the new machines, the spraying operators stand at the booths and take off the parts to be enamelled from a conveyor which serves the large baking ovens. As each part is sprayed it is conveyed to the oven entrance and then hooked on to a series of parallel bars which move through the oven body at an almost imperceptible speed at a temperature of about 350° F. These large conveyor ovens can be heated by gas, oil or electricity, and they have many advantages over other types of stoving apparatus. The stoving equipment used by the "Criterion" company is not so large as these, however, but they are certainly just as effective. The bases and parts are sprayed all

(*Continued on page* 44.)

Descaling and Pickling Titanium

by

THOMAS A. DICKINSON

RESEARCH work recently completed at Ryan Aeronautical Co., San Diego, California, has disclosed a number of satisfactory processes for descaling and pickling titanium—new "wonder metal" of the aircraft industry.

Such processes are especially important in work with titanium because the latter oxidises more or less readily at temperatures exceeding 800°F.—temperatures that are essential to the annealing, welding, and hot forming of the metal. Even where inert gases are employed, as in fusion welding, it is virtually impossible to exclude oxygen to such an extent that no oxide formations will be produced on titanium surfaces.

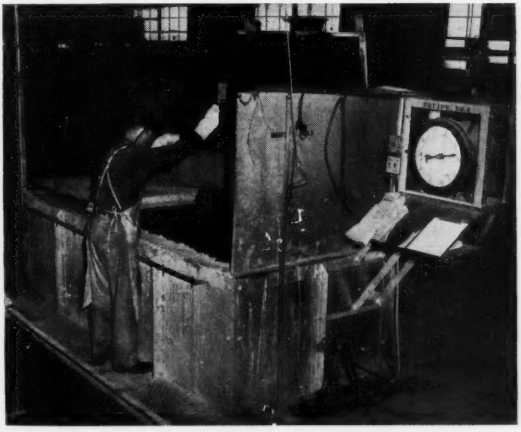
In general, oxide formations on titanium can be classed as "light" if they are produced at temperatures of less than 1,000°F.; "heavy" if they are produced by higher temperatures.

Experience at Ryan has shown that some titanium surface conditions cannot be satisfactorily corrected, but can be avoided if certain precautions are taken before the materials are processed with heat. For instance, mill stencil markings can be readily removed with a solvent-soaked rag before they are hot formed or annealed; and, if this isn't done, the markings are likely to be etched in the material surfaces following heating and pickling operations.

Similarly, titanium parts should be vapour degreased prior to heat processing in order to avoid the formation of scale which will produce a rough surface following a pickling operation.

Where the above precautions were observed, heavy oxide formations have been satisfactorily removed by:

(1) Sodium hydride processing in



Titanium parts are immersed in a salt descaling bath

a conventional manner for 1 to 5 mins., and immersing in a pickling solution comprising 40 per cent nitric acid by volume (38° Be'.) and 3 per cent. sodium fluoride by weight at an ambient temperature.

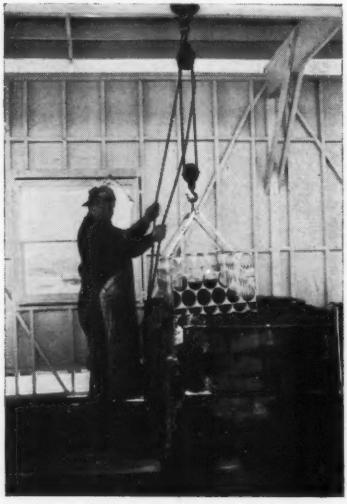
(2) Virgo processing at 800°F. for 20 mins., and immersing in the above pickling solution.

(3) Processing for 30 mins. in an aqueous salt bath comprising (by weight) 47 per cent. sodium hydroxide, 9 per cent. sodium nitrite, 6 per cent. sodium nitrate, and 38 per cent. water at a temperature of about 300°F. This is followed by the same pickling operation that is indicated for the two processes above.

The titanium parts should, of course, be quenched with cold water after they are removed from a salt bath and rinsed with water sprayed under high pressure after they are pickled.

Titanium materials with light oxide coatings have been satisfactorily cleaned by immersion for 20 mins. in a 40 per cent. nitric acid, 3 per cent. sodium fluoride pickling solution alone. However, such processing usually had to be preceded by a dezincing operation where the materials had been formed with zinc-plated or zinc-alloy tools.

Below: light oxide coatings are removed from titanium parts by immersing them in a pickling solution as indicated here



Where slight etching was required to facilitate subsequent resistance welding, Ryan has processed titanium parts with light oxide coatings in a pickling solution comprising 5 to 10 per cent. sulphuric acid (by volume), 1·5 to 3 per cent. sodium bifluoride (by weight), and 0·75 to 1·5 per cent. chromic acid (by weight) for 1 to 5 mins. at an ambient temperature. Metal losses due to the use of the latter solution average about 0·001 in. per hr.

REFINISHING REBUILT TYPEWRITERS. —(*Continued from page* 42.)

over and then left for several minutes outside the oven so that all volatile matter is removed by evaporation. The work is then placed in a static box type gas oven. The bases are placed on racks and the smaller parts are suspended from hooks. When the oven is completely full of work, the gas jets are ignited and the burners reduced to a speck of blue. For the next quarter of an hour the gas is gradually increased until the temperature reaches 320° F. This temperature is maintained for approximately three quarters of an hour, when the gas is turned off and the oven doors opened. The resultant crackle finish exhibits a uniform texture, giving a rich metallic sheen. When the enamelled parts have been inspected the work passes to another room for the application of the transfers which describe the type of model and where each base receives the "Criterion" symbol of reliability. The transfers are then lacquered and placed once again for a few minutes in the oven. The base and parts, together with the plated components, are passed on to stores where they are held ready for delivery to the mechanics' benches.

The foregoing sets forth something of the plan and scope of the refinishing processes involved in the complete rebuilding of the machines; and it can be safely asserted that the "Criterion" product represents high-class workmanship, not only in the mechanical construction, but also in the durability and elegant appearance of the product finish.

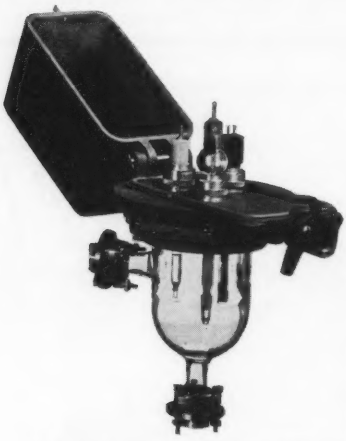
BECAUSE we have equipped and staffed our organisation technically and specifically to deal with all the problems of modern metal cleaning, we are able to provide the right process and the right product to meet any unusual requirement. Consultation with "S.A.C." technicians is the streamlined way of getting the answer which saves you time and cost.

PRODUCTION PROVED PRODUCTS

SUNBEAM ANTI-CORROSIVES LTD.

CENTRAL WORKS · CENTRAL AVENUE · WEST MOLESEY · SURREY
Tel.: Molesey 4484 (5 lines) *Grams: Sunanticor, East Molesey*

Manufacturers of
STRIPALENE · FERROCLENE · ALOCLENE · FERROMEDE · BRAZOCLENE
(Regd. Trade Marks)
APPROVED BY ADMIRALTY, WAR OFFICE AND AIR MINISTRY



Pye continuous flow type electrode assembly for pH meters. This is used where a continuous check must be kept on the pH value of a flowing liquid

Productio[E]xh

A NEW and highly successful exhibition designed to encourage and show means of improving productivity was held at the National Hall, Olympia, from 7th July to 14th July. The exhibition was sponsored by the Institution of Production Engineers, and was held under the patronage of H.R.H. the Duke of Edinburgh.

In the catalogue, an article explaining the purpose of the exhibition shows how sheer physical effort can disguise low productivity, and achieve a high level of production; lavish use of power will do the same; inventive genius can create products so unique that the efficiency of the processes which produce them becomes comparatively unimportant; high productivity relates to the skill and imagination with which these elements are used to get the maximum production from the available resources. Its importance grows as power, machinery, and technology become commonplace amongst the nations of the world, and our comparative standard of living depends increasingly on the skill with which they are used.

The basis of productivity, as of production, is research. Beginning with the exhibit of the Department of Scientific and Industrial Research on the central avenue, the exhibition aimed to tell a graphic story of the research and development which stands behind British industry; how by closer co-operation, closer understanding between researchers and those responsible for production, greater results can be achieved; how the time lag between discovery and production can be reduced; how research can be used to bring new economy to established processes. It is supported by a range of research institutions in a wide field of industries.

Wider understanding, and wholesale adoption, of the principles of standardisation could by itself lift British industry to a quite new level of productivity overnight. Correctly applied they do not impose uniformity on the individual, but are a sure road to lower costs and higher productivity. The British Standards Institution exhibit showed the application of these principles to a wide variety of industries.

One side of the hall demonstrated the human element in productivity and to methods and processes which contribute to higher productivity, production engineering, work study, industrial finishing, precision casting, instrumentation, weighing and measuring equipment, induction heating, scientific instruments, industrial refrigeration, etc. The range was wide, but they all had one characteristic in common; their contribution was not only to an improved quality of product, but to greater efficiency in the production process. On the other side of the hall were services—electrical development, production control, lubrication, high-speed cinematography, X-ray examination of metals, developments in metals and materials, stands showing the correct use of lighting and colour, and part of a complete production line showing contrast between old and new aids to production.

Exhibition

Timely information is the lifeblood of rising productivity, and the resources of the trade and technical press were displayed.

Among the stands the following were of particular interest.

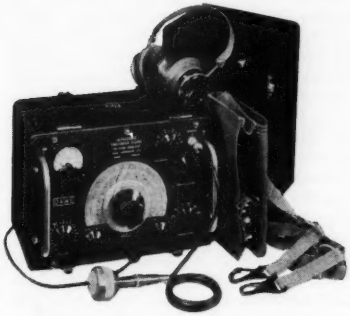
The Scientific Instrument Manufacturers' Association of Great Britain Ltd., 20 *Queen Anne Street, London, W.1. Tel.: LANgham* 4251/2.

Some of the member firms of the Association showed some of the ways in which modern instrumentation can be applied to the manufacture and processing of paints, plastics, rubber, and allied materials.

W. G. Pye & Co. Ltd. (Granta Works, Cambridge) demonstrated how pH meters and controllers could be used to measure and control the acidity or alkalinity of solutions at every stage of the process within very close limits. It has been found that such instrumentation eliminates much of the hit-and-miss adjustment common in the past with a consequent improvement in both output and the quality of the finished product. Another big advantage is in consistency since, once a satisfactory batch of a particular product has been manufactured, the instrument settings can be noted for use at any subsequent time. Such close control is vital where colour matching is involved.

Tensometer Ltd. (81 Morland Road, Croydon, Surrey) demonstrated how the use of modern testing instruments helps to maintain a high standard of quality. They concentrated on less usual applications, in particular, the advantages of taking and keeping autographic test records. Such records may be invaluable for acceptance testing and in research work.

On another section of the stand, C. F. Casella & Co. Ltd. (Regent House, Fitzroy Square, London, W.1) showed how their instruments can be used to maintain the relative humidity of a workshop or factory within ±1 per cent. and the temperature within ±1° F. This means that the optimum conditions for processing the materials can always be maintained, irrespective of weather conditions outside.



Dawe Instruments Type 1101 *ultrasonic thickness gauge*

The exhibits of the Sigma Instrument Co. Ltd. (Letchworth, Herts) showed how instrumentation can be used to maintain combustion efficiency. One instrument showed how the calorific value of gas can be regulated at a constant value, and another gave a continuous record of Wobbe index.

Dawe Instruments Ltd., 99 Uxbridge Road, Ealing, London, W.5, exhibited an ultrasonic thickness gauge. Measuring the thickness of materials by means of high frequency sound waves, this instrument has been specially designed for applications where one surface only is accessible. It measures a range of $\frac{1}{16}$ in. to 12 in. of steel, but is suitable for many materials.

Sondes Place Research Institute, (*Mactaggart & Evans Ltd.*), *Dorking, Surrey. Tel.: Dorking* 3265/6.

Sondes Place Research Institute, Dorking, is a consultant organisation which undertakes industrial research and development on behalf of individual firms in a very wide range of industries.

The Institute, as it now stands, is composed of fifteen separate labora-

tories besides stores, offices, dark room, drawing office, library, semi-scale plant buildings with 2,500 sq. ft. of floor space, and engineering workshops with about half that area. The laboratories can broadly be divided into two classes. Firstly, there are the research and development departments, such as the Main Chemical Laboratory and the Physical, Constant Temperature, High Temperature and Bench Scale Laboratories. Secondly, there are the service departments, such as the Analytical Laboratory and the Physical Testing and Cement Test Laboratories, which carry out analysis and testing for the rest of the organisation. The Dark Room, the X-ray Analysis Laboratory, the Drawing Office and the Plant Buildings and Workshops act both as service and research departments. In the last three, for example, the Institute not only designs and manufactures much of its own apparatus, but also constructs semi- and full-scale prototype plant and machinery for its clients. The Information Service, in conjunction with the Library, supplies the bibliographical needs of the Institute's staff and also conducts market surveys and a postal technical abstracting service for clients.

W. & T. Avery Ltd., *Soho Foundry, Birmingham* 40.

This company displayed hardness testing machines covering the Rockwell, Brinell and Diamond pyramid tests.

A spring testing machine and a new model tensile testing machine were also displayed.

Alumilite & Alzak Ltd., *Priory Works, Merton Abbey, London, S.W.*19. *Tel.: LIBerty* 7641.

The exhibits illustrated some of the applications to which this company's patented Alumilite and Alzak anodising processes are directed to satisfy certain demands by Industrial organisations, to provide an economical method of finishing a large variety of aluminium fabrications.

A number of items displayed were formerly manufactured in other metals, which were finished by the electroplating technique.

By close co-operation with the manufacturers at the design stage of a component, the company claims that it has proved possible, by the careful selection of semi-fabricated aluminium products and slight modifications in the method of component manufacture, to produce an anodised finish which reduces the overall cost of the finished article. Additionally, they claim increased protection against corrosion tarnishing and general wear and a more attractive appearance.

The most recent developments in their hard anodising process was also exhibited, which will permit the use of many forms of aluminium for certain applications which have hitherto been unsuitable for this material.

Black & Decker Ltd., *Harmondsworth, Middlesex. Tel.: West Drayton* 2681/7.

Black & Decker Ltd., displayed their range of portable electric tools which include drills, sanders, grinders, saws, screwdrivers, etc.

To portray the saving of both time and effort in the use of electric tools as compared with hand tools, B. & D. have carried out series of time and motion photographic tests. These were performed in a darkened room with a small electric bulb attached to the operator's wrist. Each operation was timed by means of a stop watch and the camera was synchronised so that the shutter opened and closed at the beginning and completion of each experiment.

Tin Research Institute, *Fraser Road, Perivale, Greenford, Middlesex. Tel.: Perivale* 4254.

Publications on every aspect of tin usage were available on the stand.

For the technologist there were manuals of working instructions on the following subjects:

Electrodeposition of tin and tin alloys, including tin-copper (Speculum), tin-nickel and tin-zinc; tinning by hot-dipping, soldering techniques for all metals, babbitting of bearings, chill-casting of bronzes, applications of fusible alloys and tinplate as a working material.

For the research worker there were books on the physical properties of tin and of tin alloys, equilibrium data and charts for many binary alloys of tin, a survey of organotin compounds, and the corrosion of tin and tin alloys.

For the analyst there were monographs on sampling of tin ingots and their analysis, and the analysis of impurities in tin and tin alloys by spectographic and photometric methods.

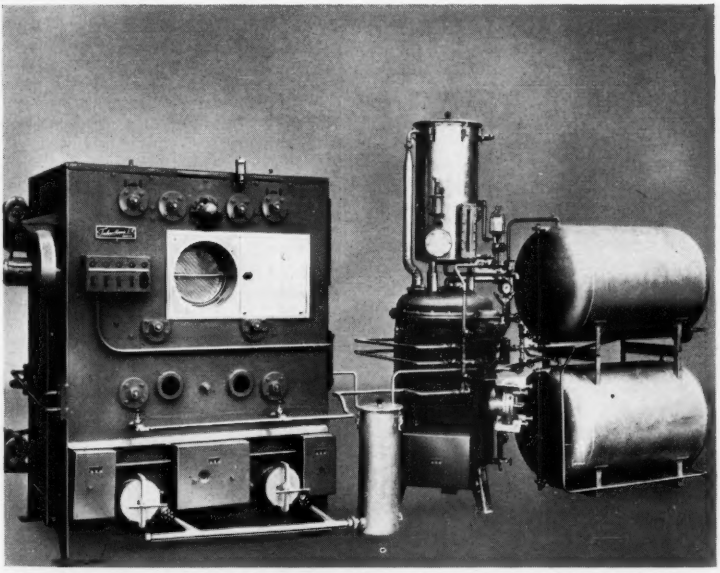
Demonstrations of electroplating with tin-nickel alloy upon small articles of brass were given.

Other products of the Institute's researches which are available now for application on the full industrial scale and were exhibited include: (a) specimens of solid and cored chill-cast bronze rods made by a semi-continuous casting method, (b) aluminium-tin alloy bearings, backed with steel, for automobiles, (c) rust-and-stain resistant tinplate ("Protecta-Tin" process) for food cans, and (d) a new alloy for spoons and forks.

Electro-Chemical Engineering Co., Ltd. *Netherby,* 161 *Queens Road, Weybridge, Surrey. Tel.: Weybridge* 3891.

The chief exhibit at this stand was the Jura fully automatic trichlorethylene degreasing machine, developed to provide for continuous production at low cost, efficiently and with good operating conditions. By the added use of a still, consumption of trichlorethylene can be kept down to 15 gallons a week when the machine is on full production. On average 12 cwts. of work can be degreased in one hour, materials being free from grease, dry and odourless on removal from the machine. Articles are conveyed through the solvent in baskets which can be rotated if desired. Being totally enclosed there is no risk to the operator of leakage of fumes when loading and unloading.

The machine is delivered complete so that installation and putting into operation is simple. Push-button control is provided and the operator can observe the passage of the work baskets through the machine through an inspection window. Distillation of contaminated solvent can be carried out continuously or when the machine is not in use, storage tanks for contaminated and pure solvent being provided. Heating with electric

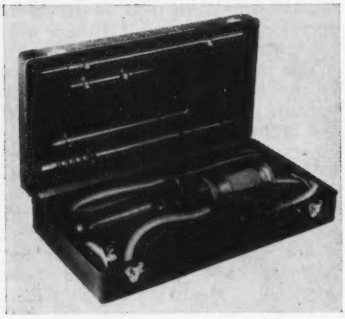


Jura "O" automatic trichlorethylene degreasing machine. Made by Electro-Chemical Engineering Co. Ltd., the machine handles on the average 12 cwt. of work an hour

immersion heaters or low pressure steam coils is thermostatically controlled.

The Murchie Trading Co. Ltd., *Airsonic Division,* 11 *Kings Road, Sloane Square, London, S.W.*3. *Tel.: SLOane* 9610.

The "Airsonic" Industrial Stethoscope is a valuable aid to fault detection. It materially reduces production costs. Rejects in manufacture are kept down to the minimum and plant breakdown avoided.



The "Airsonic" industrial stethoscope. It has no diaphragm, is non-electric and can receive sounds at any pitch.

The location of faults by sound is recognised today as a simple, certain technique. Metal objects, mechanical parts, fluids and gases, whether moving or stationary, produce or react to sound in their own characteristic way. Stresses, fissures, unsound joints or excessive wear set up variations in these characteristic sounds. To listen to these variations, amplify them and interpret them, the "Airsonic" Industrial Stethoscope was designed. It has no diaphragm, and is non-electric. Thus, having no fixed frequency of its own, it is capable of receiving sounds at any pitch, and reproducing them at uniform strength.

Reckitt & Colman Ltd., *Dansom Lane, Hull. Tel.: Hull* 16151.

On the stand were shown two specially designed viscometers developed to ensure effective physical control and maintenance of consistent quality in Ultramarine manufacture.

The control apparatus for Ultramarine illustrated two distinct developments in the study of pigments which have led to useful practical developments.

The preparation of "water-proof" Ultramarine Blue for use in lithography was demonstrated. The demonstration showed that the normal type of Ultramarine was readily wetted and dispersed in water; the other type "floated" on the surface of water.

In the lithographic printing processes a "water-wash" is applied to the surface of the lithographic plate before the plate is covered with a film of ink. As normal Ultramarine has a very high affinity for water, it passes out of the lithographic ink and this discolours the white portions of the printed image. Waterproof Ultramarine has no affinity for water, it, therefore, remains in the ink. The prints show the respective merits of inks prepared with the two different kinds of Ultramarine.

It is well known that many paints, when kept in store for a few months, give rise to hard settlement which cannot be stirred into the remaining liquid to yield a smooth paint.

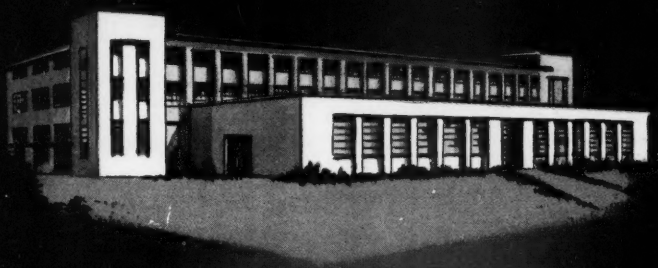
The rheological properties of paint were investigated by means of two distinct types of viscometer: these are the "Electromagnetic Thixotrometer" and the "Twin-Couette" viscometer. These two instruments enable one to make a complete study of the rheological properties of paints, and the illustration showed the curves obtained. These curves enable one to predict the behaviour of paints, and other colloidal systems, on ageing.

The British Electrical Development Association, 2 *Savoy Hill, London, W.C.*2. *Tel.: TEMple Bar* 9434.

The theme of the Association's stand was the vital part played by electricity in the field of industrial engineering. Industrial engineering is a subject which is ever growing in importance, and whereas all branches cannot be displayed, some more important fields for the study are illustrated.

Production design was demonstrated by a product which has been redesigned because of the application of a new process, such as high frequency induction heating. The effect of this change of design has

THE *Power* BEHIND



GOODRAY

Radiant Heat Stoving Enamels

★ STOVES BY RADIANT HEAT. LIGHT GAUGE METAL 2 MINUTES. HEAVY GAUGE [illegible]

★ ALTERNATIVE MATERIAL 1 HOUR AT 250°F. OR ½ HOUR AT 275°F.

★ HIGH OPACITY. BRILLIANT GLOSS.

★ ONE COAT IS EFFECTIVE ON BARE METAL.

WRITE FOR FULL PARTICULARS TO THE SOLE MANUFACTURERS:—

Goodlass, Wall & Co., Ltd.

INDUSTRIAL DIVISION - GOODLASS ROAD - SPEKE - LIVERPOOL

repercussions on plant layout and the human factors.

Industrial lighting is a field which always well repays study; a light meter, lamps, and photographs of good installations were shown.

Holland & Hannen and Cubitts Ltd., *Psychromatics Section,* 258 *Gray's Inn Road, London, W.C.*1. *Tel.: TERminus* 3388.

Head office: 1 *Queen Anne's Gate, London, S.W.*1.

The more scientific approach to the lighting and decoration of factory interiors and equipment in the interests of higher occupational efficiency was the subject of this exhibit. Under the registered name of Psychromatics the Cubitt organisation operates a specialist service for the design and installation of complete schemes embodying the most up-to-date technique.

The exhibit, in the form of a pictorial display, illustrated the principles involved and the benefits to be derived from good lighting and colour treatment and included some recent examples of successful installations carried out by the Company.

Details given of the Cubitt production facilities stressed the economical nature of these schemes and showed that by efficient organisation existing factories may be equipped without inconvenience to the current production programme.

Institution of Production Engineers, 10 *Chesterfield Street, London, W.*1. *Tel.: GROsvenor* 5254/9.

The Institute of Production Engineers was founded in 1921 as a result of the great demand for increased production during the first world war. Its present membership is almost 10,000 strong, with branches established in all the main industrial centres of Great Britain, and in Australia, Canada, India, New Zealand and South Africa. The aim of the founder members was to provide a means of studying the complex problems of industrial production, and for the exchange of ideas on productivity in general.

The Institution holds many lecture meetings and conferences in various parts of the country during the year. The Institution Journal, published monthly, records outstanding papers presented and offers a valuable medium for the dissemination of the current views and technological knowledge of leading industrialists.

The Institution offers two Schofield Travel Scholarships each year to graduates which allow a six-month study tour abroad. There are also various other awards.

The Hazelton Memorial Library constitutes a most valuable technical library and information service, keeping members fully up-to-date with the latest developments in industrial problems.

At the exhibition the Institution illustrated its many aspects and functions and provided an information service to the exhibition in general.

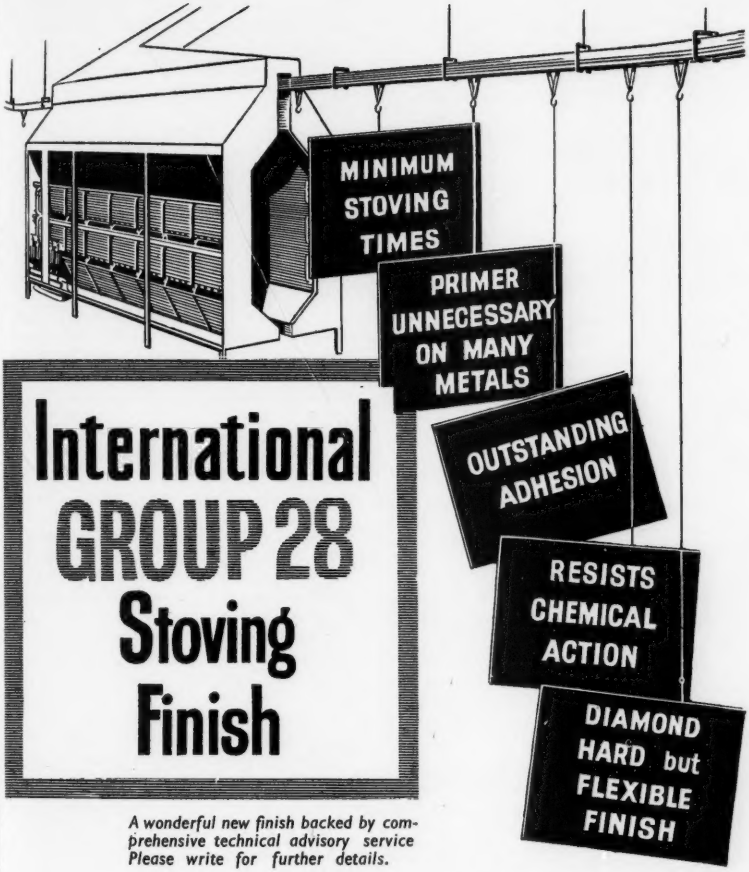
Bakelite Ltd., 12-18 *Grosvenor Gardens, London, S.W.*1. *Tel.: SLOane* 0898.

"Bakelite" resins are used for a wide range of bonding operations—woodworking, lamp-capping, grinding-wheel manufacture, etc.—because of their uniformity, adhesive strength and rapid-setting characteristics. Special grades are now produced for the revolutionary shell method of making foundry moulds and cores, and another interesting group comprises polyester resins which, reinforced with glass fibres, offer a new material of great strength for the easy fabrication of press-tools, car bodies and housings of all kinds.

Institution of Personnel Management, *Management House,* 8 *Hill Street, London, W.*1. *Tel.: GROsvenor* 6000.

This exhibit illustrated personnel management's contribution to better industrial relations and thus to increased productivity. Productivity depends upon the collective contribution of all grades of workers, and personnel management aims at the best and fullest use of their capacities, which can only be achieved if their well-being and co-operation at work is ensured.

The exhibit also described some of the Institute of Personnel Management's activities through which it seeks to achieve its aim of furthering the development of personnel management, such as information services, training courses, meetings, conferences and publications.



International GROUP 28 Stoving Finish

A wonderful new finish backed by comprehensive technical advisory service Please write for further details.

International Paints Ltd.

Head Office: **GROSVENOR GARDENS HOUSE, LONDON, S.W.1**

TELEPHONE: TATE GALLERY 7070 (15 LINES)

TELEGRAMS, INLAND: CORROFOUL, SOWEST, LONDON. OVERSEAS: CORROFOUL, LONDON

REGISTERED TRADE MARK

MAIN FACTORY IN U.K. FELLING-ON-TYNE

ASSOCIATED FACTORIES IN

AUSTRALIA	SYDNEY	GERMANY	HAMBURG	NEW ZEALAND	WELLINGTON
BRAZIL	RIO DE JANEIRO	ITALY	GENOA	SPAIN	BILBAO
CANADA	MONTREAL	ITALY	TRIESTE	SWEDEN	GOTHENBURG
CANADA	VANCOUVER	JAPAN	KOBE	U.S.A.	NEW YORK
DENMARK	COPENHAGEN	MEXICO	MEXICO CITY	U.S.A.	SAN FRANCISCO
FRANCE	LE HAVRE	NORWAY	BERGEN	VENEZUELA	MARACAIBO

Remington Rand Ltd., *Commonwealth House,* 1-19 *New Oxford Street, London, W.C.*1. *Tel.: CHAncery* 8888.

Industrial evolution becomes increasingly dependent upon efficient techniques of production control. Remington Rand, recognising the urgency of production problems, have provided without fee or obligation, an unrivalled systems advisory service, backed by a comprehensive range of equipment specifically designed as production aids. These include: "Kardex," which brings order and control to production, from design to final assembly; "Graphdex," charts and planners which control the movement of material in production and express visually the immediate and forward load on machines; "Sched-U-Graph," which is extensively used for machine loading, but has far wider applications.

Ministry of Labour and National Service, 8 *St. James's Square, London, S.W.*1. *Tel.: WHItehall* 6200.

The services provided by the Ministry of Labour and National Service illustrated "The Human Factor in Productivity."

Section I—"Opportunity to Work" dealt with the problems of the disabled; other adults in need of training; older men and women; ex-Regulars; redundancy and transfer.

Section II—"Making the Best use of Manpower" dealt with the Ministry's Vocational Guidance and Careers and Placing Services; Training Within Industry (T.W.I.); and Apprenticeship Training and Personnel Selection.

Section III—"Avoiding Wastage of Manpower" dealt with safety, health and welfare of workers and the service provided by the Ministry's Factory Inspectorate.

Section IV—"Aiming at Good Team Work" dealt with good personnel management, joint consultation and the Ministry's Personnel Management Advisory Service; communications in industry.

There was also a stand with a display showing the Service provided by Education Authorities and the Ministry of Labour and National Service for assisting boys and girls to find the jobs best suited to them.

Ministry of Fuel and Power, *Thames House South, Millbank, London, S.W.*1 *Tel.: ABBey* 7000.

The Ministry of Fuel and Power exhibited means developed in recent years to improve the fuel efficiency in industry.

In the promotion of fuel efficiency the Ministry until recently, among other services, provided direct technical advice to the industrialist initially by means of individual visits from experienced fuel engineers but increasingly by the use, in the factory involved, of a wide range of metering and recording instruments. Operated by a team of engineers this instrumentation provides detailed information capable of yielding on analysis a complete heat and power balance for the whole factory. Such surveys have given valuable results in revealing immediate possibilities of increasing economy and efficiency which are generally associated with higher productivity. They also provide basic information for forward long-term planning. The necessary equipment—flow meters, multi-paint recorders, gauges, special fittings of one kind and another—have, to secure mobility, been housed and transported in suitably adapted and fitted vans, one of which with all its contents will be on exhibition. This service to industry, among others, has now been taken over from the Ministry by the newly constituted National Industrial Fuel Efficiency Service, which aims to continue and expand this work.

R. H. Corbett & Co. Ltd., *Hydrum Works, Burgess Hill, Sussex. Tel.: Burgess Hill* 3333.

R. H. Corbett & Co. Ltd. showed equipment which contributes to increased production. This included the well-known "Hydruped" fork lift truck, the "Hydrum LP" loader, the "Hydrum STP" stacker, and the new "Hybarrow" which is an entirely new machine with foot-operated hydraulic lift for transporting and lifting on the "sack barrow" principle. It is strong and light and has a capacity of 500 lb. to a height of 54 in. and the price is modest.

Also new was the "Hydrum Hystacker." This machine has been specially designed for stores of considerable height where it is desired to

BONDERIZER
BONDERIZER
BONDERIZER

keep the passages as narrow as possible. The operator travels up with the load, which he transfers to shelves at the appropriate level. The machine is operated by traction battery or by mains electricity as desired, and it can work in aisle width of 2 ft.

Fisher & Ludlow Ltd., *Bordesley Works, Birmingham* 12. *Tel.: Victoria* 2371.

The aim of the stand was to give a general picture of the various methods of material handling as a means to increased productivity.

The Pallet Selection Chart showed ten basic pallet types plotted against eight Material Groups, so that it was possible to see at a glance the correct type of pallet for the selected material, or, conversely, which groups of materials can be handled on the selected type of pallet.

The "Flowstack" Pallet Manual can be obtained from the manufacturers.

The "Flowlink" unit-construction overhead chain conveyor with pressed steel track, all bends, both horizontal and vertical, press made and interchangeable and the "Flowline" unit-construction belt conveyor system for transporting, processing, assembling and packing with standard range belt widths 12 in., 18 in., 24 in. and 30 in. and capacities up to 6,000 lb. load per conveyor were also exhibited.

Rubery, Owen & Co. Ltd., *Darlaston. Tel.: Darlaston* 130.

Conveyancer Fork Trucks Ltd., *Warrington. Tel.: Warrington* 2244.

Exhibits included a range of metal pallets produced by Rubery, Owen & Co. Ltd., and a battery electric "Conveyancer" fork truck produced by Conveyancer Fork Trucks Ltd. Both companies are members of the Owen Organisation.

The use of fork trucks and pallets has been developed in British industry very widely since 1945 and the contribution to increased productivity which these methods of handling have brought about is outstanding. There is hardly a branch of industry which could not benefit from a study of its materials handling methods, and it is in materials handling method improvement that the greatest potential economies are generally to be found.

During the exhibition the stand was manned by materials handling experts from the two exhibiting companies.

Jenolite (Scotland) Ltd. at Scottish Industries Exhibition.—When the Scottish Industries Exhibition opens at Glasgow's Kelvin Hall on 2nd September, Jenolite (Scotland) Ltd. will be represented on a Stand under the canopy of The Engineer Industries Association Stand.

The object of their display is to give the visitor and prospective customer a first-hand insight into the speed and efficiency of the rust removing and rust inhibiting properties of Jenolite Rust Remover and Neutraliser (RRN). To this end, three demonstration tanks are to be installed which cover the whole of the basic pre-treatment process.

The first tank will contain a degreaser (Jenolite PD1), the second will be a rinse tank, and the third will show rust removal and inhibition with Jenolite RRN. Also to be demonstrated is their chemical sealer, which is used to obtain protection against rust before painting. These three tanks will show in miniature the methods employed by large industrial concerns which are users of the various processes. A representative will compere the demonstrations and answer questions at each stage.

New "Pyrene" Crash Tenders for the R.A.F.—The Pyrene Co. Ltd., the well-known manufacturers of fire fighting equipment, have received a substantial contract from the Ministry of Supply on behalf of the Air Ministry, for a new type of "Pyrene" Foam Tender to be supplied in quantity for airfields used by the Royal Air Force at home and overseas.

The increased speed of operation and fire fighting efficiency of these tenders represents an important advance in airfield fire protection. Each tender is capable of producing 6,000 gal. of fire fighting foam in 1½ min., and comes into action the moment it reaches the scene of the fire.

Honeywell-Brown Ltd.—A recent publication of Honeywell-Brown organisation contains extracts from a talk given by Henry F. Dever, president of the Brown Instruments Division of Minneapolis-Honeywell Regulator Co., before the Boston Society of Security Analysts. In his talk, Mr. Dever reviewed the question "how automatic can we get?" and drew the conclusion that the opportunities for increased instrumentation and greater automatic control are almost boundless.

Dohm Ltd.—In our last issue we referred to a vacuum metallising process. The name of the firm concerned should have been spelt Dohm and not Dome as we had it.

Reflection Densitometer for Colour Measurement

ACCURATE colour measurement is a necessity in industry today. About ten million colours are distinguishable to the human eye. The average man can comfortably distinguish about ninety-five colour family combinations, but he cannot use with certainty more than about two dozen family names. Considering this and the fact that no two people see those colours discernible to the eye in the same way, it is clear that an individual's "colour sense" is likely to be too fallible for the requirements of industry and that some means of actual physical measurement by an instrument is necessary. An example of such an instrument is Baldwin Instrument's reflection densitometer.

This device consists of their photometer, used in conjunction with a reflection densitometer attachment pictured here.

The photometer consists of a vacuum photocell and a mains operated D.C. valve amplifier, fitted with an indicating instrument, range switch and zero control. In the photo-emissive vacuum cells, incident light liberates photo-electrons from the cathode; these are then collected by the anode and passed to the amplifier. The cells used for the reflection densitometer are specially selected for their colour sensitivity.

In the reflection densitometer a small spot—about $\frac{1}{16}$ in. is illuminated by a light beam incident at an angle of 45° the light reflected perpendicularly to the surface is measured. Colour filters are inserted to measure the density in terms of colour components.

All colours comprise a combination of the three primary colours—red, yellow and blue. Equal proportions of each from white. By using red, yellow and a blue filter in turn in the densitometer it is thus possible to determine the exact proportion of each primary in any colour, and, when matching, one can determine the exact proportions of the particular colours which are deficient to make a true match.

Baldwin Instrument's reflection densitometer. Colour filters can be inserted to measure the density in terms of colour components

Operation

Firstly the standard is placed under the densitometer and the instrument is zeroed. Then, placing the three primary filters into the instrument in turn and noting the reading for each filter, the exact breakdown of the standard is discovered. The test piece is examined with the settings as for the standard. Comparison of the readings enables a true match to be made. Neither the standard nor the test pieces need be surfaces small in area because the instrument is

portable and can easily be placed over large surfaces.

Applications

The use of this kind of instrument is becoming essential in factories making a large range of products which must match each other. One example which springs to mind is that of the kitchen equipment manufacturer. The sink units, refrigerators, washing machines, cabinets and hollow ware will rarely be made in the same factory, but when they come together in the kitchen any difference in shade soon shows up.

Because some kitchen appliances are finished in vitreous enamel, some in organic finishes and some in combinations of both, the problem of getting a good match in such a case is a serious one. Usually the colour standards are taken from the vitreous enamel shades and matching is made from them, since the colour range of vitreous enamel is less flexible.

If human "colour sense" is used in a factory making a continuous run on any product such as a series of motor-car bodies or wings designed to be built together later with other parts, a gradual drift of colour will occur between the start and finish of the run, undiscerned until the difference is discovered by the assembly department when it is too late.

Because the human eye can be influenced by so many factors which do not affect an instrument—factors such as individual differences of vision, health, fatigue, influence of surrounding colours, the difficulty of verbally defining colours—the insrument is very much more efficient and reliable at detecting colour changes by random inspections.

Acknowledgments are made to Baldwin Instruments Co. Ltd., Brookland Works, Dartford, Kent, who have recently marketed the instrument referred to above, for their co-operation in supplying the information and illustrations on which the article was based. This firm invites manufacturers' enquiries together with samples of materials to be measured in their laboratories.

GAS RADIANT UNIT IN CONTINENTAL FACTORY

THE most recent gas-fired industrial radiant unit installation by Bratt Colbran Ltd., to be placed on the Continent, is in the works of D'Ieteren Frères at Forest, Brussels, producing Volkswagen — family and commercial vehicles.

There are three separate tunnels—one for drying after pre-treatment on spare parts, another for stoving the finished coat on spare parts, and the third, illustrated herewith, comprising eighty-four units and is for stoving undercoat on complete car bodies, the finished coat being cellulose. This is the first time that a gas-fired infra-red tunnel has been used for stoving complete car bodies in Europe. The output of cars from this works runs to 18,000 per year.

Motor vehicle cab about to enter the radiant tunnel unit at the works of D'Ieteren Frères, Belgium

WATER WASH SPRAY BOOTHS *of* GREATER SIMPLICITY *and* HIGHER EFFICIENCY

There are no pumps, nozzles or filters to choke or need attention. The only moving part is the fan, which handles the clean dry air from the high efficiency wash and discharges it to the atmosphere.

We welcome enquiries for incorporating these advantages in proprietary booths. We can also offer the same advantages of clean exhaust with very little maintenance for DUSTS AND FUMES FROM POLISHING, GRINDING AND PLATING

DRUMMOND PATENTS (HOLDINGS) LTD

5 GREAT WINCHESTER STREET, LONDON WALL
LONDON, E.C.2

Telephone: LONDON WALL 4432 & 2626

Neat Gas Burner Applications of Finishing Interest

The following extracts from a paper, "The Applications of Post-Aerated Burners in Industrial Gas Practice," by A. E. Wilson, Group Industrial Engineer, Huddersfield/Halifax Group, North Eastern Gas Board, give explanations of the uses of neat gas in finishing. The paper was presented to the Gas Council, B.I.F. Industrial Gas Conference, Birmingham, 10th-12th May, 1954.

IN the introduction Mr. Wilson maintains that a heat system should be commensurate with temperature requirements. The temperature requirements he deals with in the paper are up to 1,000° F. Taking a number of different heating needs, he gives examples of the use of post-aerated gas in each.

Liquid Heating

The first case to be considered is "liquid heating," not of course a ring burner under a tank but immersion tubes of appropriate diameter and length. Assuming that the tank is of such dimensions that tubes of sufficient length can be accommodated, what can be simpler and more efficient than a neat gas burner? The following information from the U.S.A. published in *Industrial Heating*, November-December, 1945, has been used as a guide in all our tube firing jobs:

B.Th.U. per sq. in. of cross-sectional area per hour $= 5{,}000\frac{\sqrt{10}}{L}$

this gives—3 in. dia. tubes 10 ft. long, a figure of = 35,000.
—4 in. dia. tubes 6 ft. long, a figure of = 72,000.

The formula appears to give figures which are consistently low, as in practice we exceed these by approximately 20 per cent. Where the work output required cannot be achieved by this method then the bunsen flame or even air blast must be used, since by using aerated burners more B.Th.U. can be released per sq. in. of cross-sectional area. Some of the conventional applications are listed below:

Solution Heating

(a) *Water soluble degreasers.* The tanks used for water soluble degreasers—usually caustic soda—are simple mild steel tanks, but the tubes are placed in banks so situated as to suit the particular jobs being loaded. This remark applies to all the tanks in the categories now about to be mentioned. In other words, the tubes can be placed vertically near to one wall, or in two banks along each side wall, or the side walls can be recessed and the tubes situated in this recess, thus giving full loading width. This is particularly useful where the work is loaded by a hook or other similar device from an overhead crane. In very few instances are the tubes placed in a horizontal bank on the bottom of the tank, due chiefly to the accumulation of sediment and the difficulty of cleaning out.

(b) *Rust-proofing solutions, phosphates, colour finishes, e.g., blacks and browns.* Phosphate solutions, whether used for rust removal, rust prevention or etching, attack mild steel, but tests have shown that if renewals are made after a definite "hours worked period," then special materials need not be used. This also applies to the tanks and tubes used with the various colour processes, since etching is carried out before the peat compounds can adhere.

(c) *Lime tanks and other liquids, e.g., borax for wire coating.* The most important aspects of this application

have already been mentioned, namely, leaving the full width of the tank available by placing the tubes in a recess, and secondly, avoiding bottom tubes because of sediment formation and cleaning difficulties. Another snag which has arisen with the use of coatings other than lime and borax is that welds appear to become embrittled and cracks appear. This enforces the condition that the tubes shall be fitted by screwing and not by welding.

Forced Convection

Process work carried out by means of forced convection, with or without recirculation, entails the use of such large volumes of air—due to its low specific heat—that the mechanical handling plant can become disproportionate, both in size and capital cost, except for temperatures up to, say, 600° F. A typical installation such as is shown in the following diagram has a fan handling 3,200 c. ft. of air per minute at 500° F., against 2½ in. w.g. with one water-cooled bearing fed by thermal gravity from a small galvanized tank. The particular apparatus described to illustrate this application is a direct air heater for use on core stoves, paint baking ovens and other miscellaneous drying operations where products of combustion have no adverse effect on the product.

Many air heaters consist simply of an insulated box—sometimes bricklined—attached to the inlet of a hot gas fan; the gas burner is in effect an open pipe, although it may be elaborated for appearance sake, and is introduced into the end of this box. Obviously such an arrangement cannot be very expensive, and when we found that the cost of electronic flame failure gear would considerably exceed that of the plant itself we felt that some other protective device must be adopted. Accordingly, we decided to use an external neat gas burner of the drilled rail and brickslot type, as we could then use the simple thermo-electric flame failure device externally. Such an arrangement is shown in Fig. 1.

It will be seen that no gas can flow until the fan is running, the suction of the fan is utilised to pull the pilot flame on to the couple and ignition achieved by the ladder principle. In our own area we have used this type of plant for many applications. We have eight core ovens, varying in size from 22 ft. × 10 ft. × 8 ft. to 12 ft. × 5 ft. × 6 ft., where, by means of Venner time switches, we perform the drying operation during the night with the complete absence of labour. In the realm of paint and varnish baking we have at one firm of electric motor manufacturers five saddle-back conveyor ovens, all equipped with air heaters, and all with electronic flame failure apparatus; in this case the cost of such protective gear was obviously but a fraction of the total cost.

Chemical Works

Though not strictly a post-aerated burner, the Barber burner, manufac-

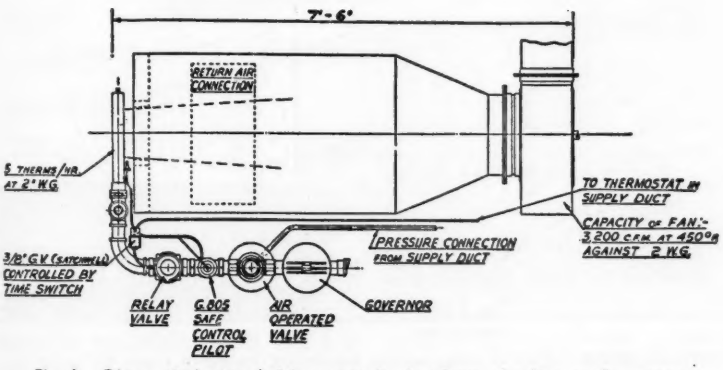

7'-6"
RETURN AIR CONNECTION
5 THERMS/HR. AT 2" W.G.
TO THERMOSTAT IN SUPPLY DUCT
CAPACITY OF FAN:- 3,200 C.F.M. AT 450°F AGAINST 2 W.G.
PRESSURE CONNECTION FROM SUPPLY DUCT
3/8" G.V. (SATCHWELL) CONTROLLED BY TIME SWITCH
RELAY VALVE
G.B.O.S. SAFE CONTROL PILOT
AIR OPERATED VALVE
GOVERNOR

Fig. 1. Direct air heater (with automatic shut-down via time on fan motor starter and solenoid valve on relay valve bleed)

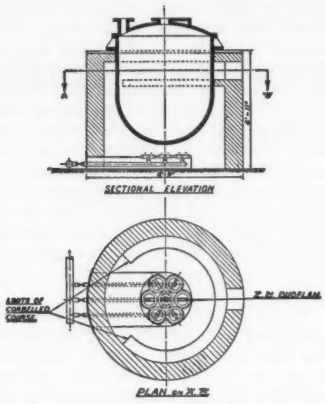


Fig. 2. Setting using Duoflam burner for 300-gallon pan at chemical works

tured and marketed under the name Duoflam, is sufficiently so to be considered in this paper.

The application which is now to be illustrated could be equally well achieved by true luminous flame jets, but as the Duoflam burner is available built up in suitable combinations, and is both compact and robust, it has been chosen for the job.

In chemical "still" heating, particularly in distillation, it is essential that there shall be available a considerable range of turn-down. The Duoflam set fulfils this requirement. It is also an advantage that the heat source shall be a solid plate of flame and not rings or bars. Once again this can very readily be achieved. Fig. 2 shows a typical arrangement; all the air for combustion is drawn through the box, and thence through the zone of the flames.

No flap or other moving device is incorporated on the air opening, as experience has shown that, due to the atmosphere of the chemical works, moving parts soon cease to move.

It is not to be presumed that this is the only method of vessel heating. We are using several other methods ourselves, one of which could have been included in the section on air heaters. The circumstances which occasioned its use were unusual and therefore the plant merits a special mention.

We were asked to provide a source of heat to two fusion pans where there was a considerable fire risk and where it was essential therefore that the heat source should be remote. The temperature range—up to 325° C.—was rather high, but a hot air recircu-

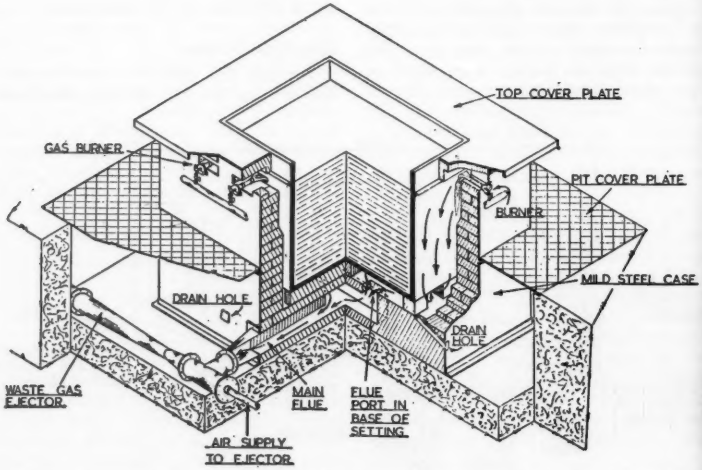
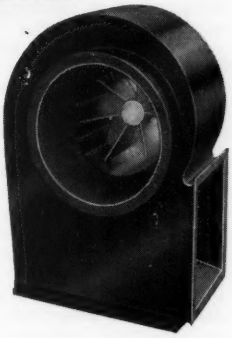


Fig. 3. Isometric View of 7-ton capacity Galvanizing Setting to design of Yorkshire Industrial Gas Centre

Do your finishing processes finish your fans?



Strong acids, alkalis and moist gases are deadly to Fans, Hoods and Ducting ! But not to the amazing P.V.C. "Resista" Fan, Hoods and Ducting. They are impervious to chemical fumes. Think what this means to you in terms of economy and uninterrupted output.

"Airflo" TRADE MARK

"RESISTA FAN"
with steel outer casing
SEND NOW for details of this new development in chemical fume handling technique.

Industrial Fan & Heater Co Ltd

"Airflo" Works, BIRMINGHAM, 11, phone: VICtoria 2277

LONDON: 2 Oaklands Avenue, Brookmans Park, Herts. *Phone: Potters Bar 5175.*
MANCHESTER: City Buildings, 69 Corporation Street, 4. *Phone: Blackfriars 6918*

A TOUGH DURABLE FINISH . . .

The Enamel that COVERS in ONE-COAT

Send for a sample of 'SNAPPOL' and prove it yourself !

SNAPPOL

SYNTHETIC ENAMEL

NO TAIMING OR UNDERCOATING NECESSARY TO OBTAIN 100% ADHESION

FULL GLOSS AND SOLID COVER WHEN APPLIED DIRECT TO BARE METAL

AIR DRIES IN 40 - 50 MINUTES

STOVES: INFRA-RED 3 - 4 MINUTES

CONVECTION OVEN 10 MINUTES

Joochow INDUSTRIAL FINISHES

DONALD MACPHERSON & CO. LTD. *INDUSTRIAL FINISHES DIVISION*
CHURCH ROAD, MITCHAM, SURREY—21 ALBION STREET, MANCHESTER 1

lation plant was designed, built and installed in a brick-built annexe, the ducting entering and leaving the brick settings through the dividing wall. This plant performed the function for which it was intended admirably—but it did more. Such was the evenness and controllability of the heating that the yield per batch was almost doubled. *This is one feature of heating by air, or air and products, which is worth stressing. If the volume of gaseous medium is large enough then it is possible to operate with quite a low temperature head and the danger of overheating or overrunning control points is very much minimised.* It is this aspect which makes this rather expensive arrangement attractive to the chemical industry, particularly where the reaction is exothermic. The price of such a plant as that mentioned for the two fusion pans above is in the region of £640 whilst the Duoflam sets previously mentioned can be fabricated for approximately £35 each.

Galvanizing Baths

Many of you will be familiar with the galvanizing bath setting designed by the Yorkshire Industrial Gas Development Centre, in which the heat was released at the top of the side walls and drawn downwards by either an eductor or natural flue pull.

The burner equipment consisted of natural draught injectors with slotted head burner ports (Fig. 3).

Now it is an accepted fact that there are limits to the amount of heat that can be passed per unit of area through the wall of galvanizing baths and so we decided to amend the burner arrangement and replace the aerated burners by luminous jets as we felt that we could release the maximum allowable B.Th.U. by this means. The setting is almost identical with that of the first design except that the combustion chamber is expanded at the top and the burner placed well away from the bath wall, as shown in Fig. 4.

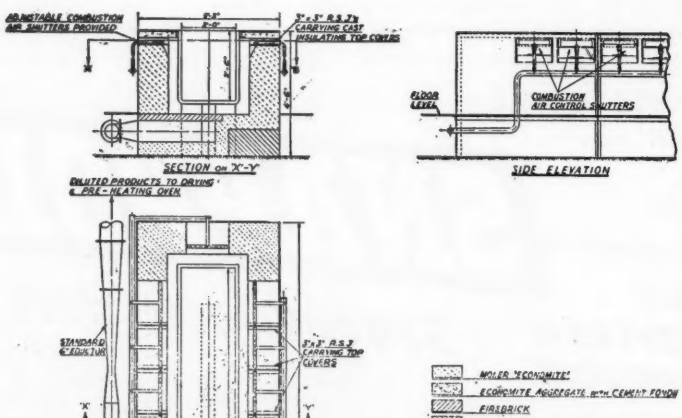


Fig. 4. 12-ton Induced Draught Galvanizing Bath with Modified Burner Equipment

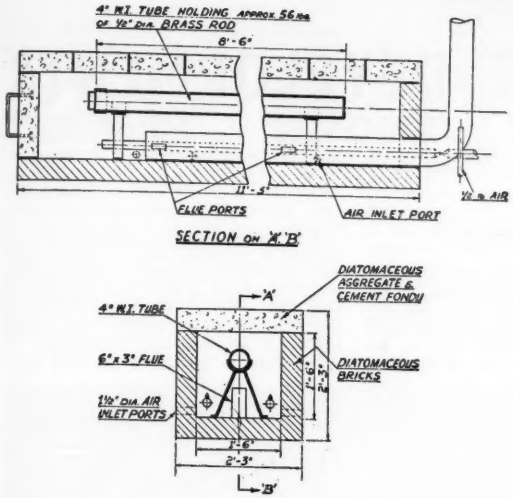


Fig. 5. Temporary Oven for Stress Relieving small quantity of Brass Bar

The burners are drilled rails with No. 6 Aerojets and the fan air pressure to the eductor is 21 in. w.g., the mixed air and products being used to dry the flux on the ingoing work.

In practice we found that it was not possible to distribute the pull evenly over all the burners, bricks are not cut or laid to "thous." and we have, therefore, fitted adjustable slides on the air intakes. These slides are first set by visual means, in other words, by noting the downward tendency of the flames, and then by analysing the flue gases. A typical figure is 6·4 per cent CO_2 and a temperature of 395°C. at the eductor connection. The plant shown is producing glazing bars for roof lights and patent glazing and the average output is 10 cwt. per hour. The maximum gas rate is 5·75 therms per hour and over a test period of about five weeks we have been achieving a gas rate of approximately eight therms per ton of steel galvanized. The bath has been fitted with insulated covers as it works days only, and the holding consumption—nights and week-ends—is 2½ therms per hour.

This plant, whilst demonstrating the simple fundamentals of galvanizing bath heating by putting in the heat where the bath wall is cleanest and at the point of maximum heat loss, has also proved that by utilizing a continuous ribbon of flame round the bath, uniformity of zinc temperature can be maintained within 5°C. of the control temperature at any point over the area and at any depth down to the dross line.

Standard Ovens, Etc.

Some of the orthodox applications can be gathered together under one heading. The ones I have in mind are central heating boilers; steam boilers of the fire tube type; bakers' ovens; batch ovens—both double and treble cases—and other ovens used for small cores, paint baking, drying operations, vulcanising and many other jobs up to 500°F. I do not propose to elaborate this group but as the choice of equipment is usually Bray jets or Aerojets it is relevant under this item to describe an installation for stress relieving non-ferrous bars and castings.

It must be agreed that forced convection would be the best method, but where the quantity of work involved is small or perhaps only "a one-off" then a cheaper method must be used. We have had two such jobs worth recording, the first being a batch of aluminium castings and the second a spot lot of brass rod.

In the first case it was the removal of casting strains and in the second,

(*Continued on page* 69.)

RECENT DEVELOPMENTS
MATERIALS : PROCESSES : EQUIPMENT

VACU-BLAST PROCESS

THE first commercial application of the Vacu-blast shot-blasting process in Scotland was demonstrated recently at the premises of the Motherwell Bridge and Engineering Co. Ltd. the process has the virtue of eliminating the risk of silicosis, inherent in the shot-blasting process. The demonstration was arranged by Mr. J. Johnston Mann, director of Jenolite (Scotland) Ltd., with the co-operation of the Motherwell Bridge and Engineering Co. Ltd., and James Grindlay, Bishopbriggs.

The blasted sheet metal was afterwards Jenolited to prevent corrosion.

The demonstration aroused considerable interest among the industrialists present at the demonstration and is regarded as promising steady adoption of the equipment in work of this type in this area.

FLUOROCARBON COATINGS ON ALUMINIUM

A DISPERSION process for applying thin firmly bonded fluorocarbon coatings, 1-200th to 1-100th in. thick, to aluminium, has been developed by the Connecticut Hard Rubber Co.

Coatings applied by the process are said to be so firmly bonded to the metal that they do not crack when the metal is bent and cannot be stripped or peeled off. They are also said to be of uniform thickness throughout the area of application and to be entirely free from faults such as minute holes or cracks.

Connecticut Hard Rubber Co., New Haven, Connecticut.

TUNGSTEN METAL SURFACE ON PLASTICS

A PROCESS for applying a hard self-lubricating tungsten metal surface to plastics has been developed by the Lockrey Co., Southampton, New York. The metal, which is applied in the form of a semi-colloidal suspension of tungsten in a plastic medium, can be applied at room temperature.

The surfacing compound can be applied by spraying, dipping or by brush and the finished surface is claimed to be almost as hard and as wear-resistant as tungsten itself. The self-lubricating quality is due to the addition of a special agent to the surfacing compound.

Lockrey Co., Southampton, New York.

ULTRASONIC DE-GREASING PLANT

AN ultrasonic cleaning plant claimed to be the first of its kind to be made in Europe and believed to be the first completely automatic unit in the world has been made to the order of a well-known firm who require to clean small precision engineering parts to a degree not obtainable with conventional cleaning machinery. It was produced jointly by Ultrasonics Ltd., and Mullard Ltd., who were approached by the Board of Trade some two months ago. The company who have ordered this plant wished to import a machine from the U.S.A., but they were referred to the above Companies to see if a unit could be produced in this country.

As no information was available as to the type of plant produced in the U.S., this unit had to be designed and produced from scratch in two months due to urgency of the users requirements.

It has been established that if an article to which foreign particles, e.g., grease or other matter is adhering, is irradiated *Ultrasonically* in a bath containing a suitable fluid, the part will be made chemically clean. The Ultrasonic energy is able to reach those parts of the articles which are normally inaccessible, and foreign particles are rapidly dislodged. A suitable frequency and intensity are necessary depending on the nature of the material to be cleaned. In this particular plant the frequency is one megacycle and the maximum intensity at the transducers approximately five watts/cm^2. This means that the generator which has an output capacity of 2½ Kw., is sending out electrical pulses at the rate of one million per sec. The transducers which are in this case barium titanate vibrate in sympathy with the frequency

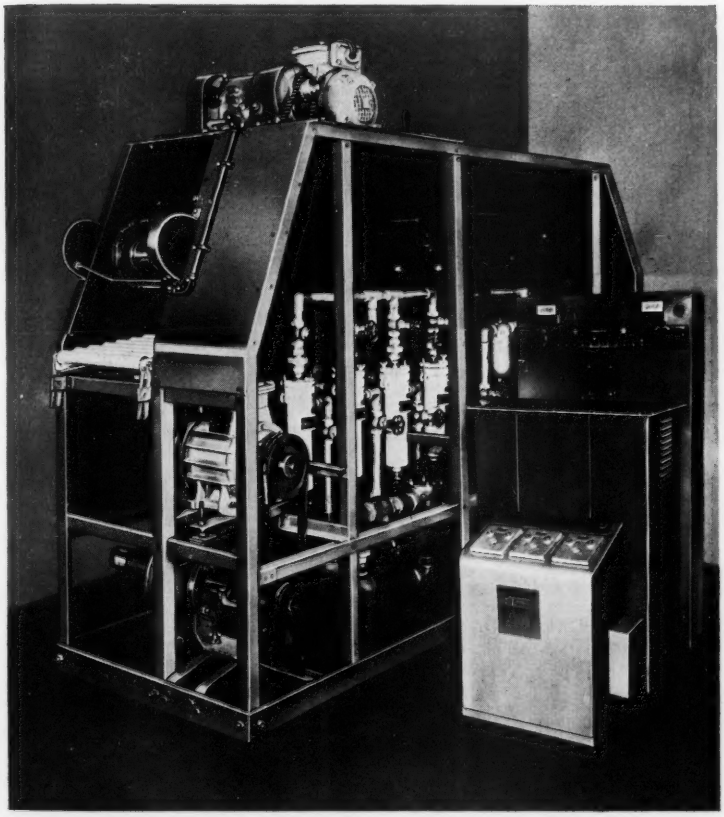
of the generator and the energy is transferred from the transducers directly into the liquid.

Barium titanate is a man-made ceramic crystal which has the advantage over quartz of needing only low voltages for excitation, and can, therefore, be operated in direct contact with the liquid.

The parts to be cleaned are placed in open wire mesh trays. These run into the plant on rollers and are automatically backed up on a conveyor which takes them through the two stage cleaning process. The cleaning fluid is recirculated through a magnetic filter in the first stage, and a combination of magnetic and ceramic filters in the second stage.

At the end of the conveyor system the trays are transferred to another roller conveyor on which they travel to the next stage in production. It is estimated that over one million parts will be cleaned daily in this machine. The variable speed drive on the conveyor allows considerable latitude so that the plant can be run at a speed to match the production rate of the preceding processes.

The cleaning fluid in the tanks can be removed simply by the operation of valves, and a new charge introduced. The fluid which will become charged with oil in the course of time will be delivered by the pumps on the plant to distillation equipment so that it can be used again.



Ultrasonic cleaning plant. One million pulses per second are transmitted from transducers directly into liquid in which articles to be cleaned are immersed. Over one million parts are to be cleaned daily in this machine.

Industrial Electronics

Recent International Convention

MORE than 300 delegates from many parts of the world and representing nine industries met to discuss industrial electronics at a Convention held at Oxford from 8th July to 12th July.

Among the industries represented were the aircraft, motor, rubber, oil, iron and steel, glass and instrument manufacturing, the film industry and electricity supply. Countries sending representatives included the U.S.A., Canada, France, Holland, Australia, India, Pakistan and Eire.

Thirty-eight papers were discussed, all of them dealing with the application of electronics to industry. Among the subjects covered were computers for office and factory, ultrasonics, industrial X-rays, nucleonic instruments, gauge transducers, engine testing and machinery control.

Certain papers presented at the Convention are of some interest to finishers. A summary of these is given below.

Industrial Applications of X-rays and Sonics

A Method of Ultrasonic Gauging, by F. M. Savage.

This paper described a method of measuring wall thickness accurately although only one surface is accessible. A variable frequency oscillator is employed and standing waves are set up between the transducer and the reflecting surface. At the resonant frequency and its harmonics the oscillator anode current increases and the measurement of the frequency interval between these peaks enables the thickness to be calculated.

Improved Techniques in Ultrasonic Flaw Detection, by G. Bradfield.

The use of barium titanate crystals with backing and with monitoring crystals to assess the ingoing signal for flaw detection was discussed. The use of laminated wedge mode changers and steerable beam systems of ferro-electric materials were described.

Some Typical Circuits for Industrial X-ray Apparatus, by J. J. Blias.

The nature of X-rays and their use in non-destructive testing was briefly outlined. Suitable X-ray tubes and the associated h.t. generators were described and problems of exposure control and timing referred to. A typical 250 kV industrial X-ray generator was described in some detail, special attention being paid to the control equipment.

Electronic Sensing Devices

Optical Transducers and Some Industrial Applications, by J. A. Sargrove.

After a brief survey of the principles and characteristics of photocells and electron multipliers, the advantages of various optical arrangements for different applications were considered. Sharp focus light spot transducers for reflectometers and light scatter transducers for nephelometric determinations were described. Reference to suitable transducers for particle detection in liquids, goniometric applications such as high-speed weighing, line following and edge alignment equipments, was made.

Electronic Control of Resistance Welding, by C. R. Bates.

The electronic circuits commonly used for single-phase welding controls may be classified into two basic types, (1) leader-follower circuits; (2) feedback trigger circuits. Details of these circuits were given after a brief description of the requirements for control of resistance welding processes. The various welding techniques and applications were explained, together with the electronic-control of weld heat for spot and seam welding. A discussion of various control circuits followed, including "slope control" for welding aluminium and its alloys. In this, the rate of change, or slope, of weld-current is accurately governed and yet may be easily varied or adjusted. Circuits for automatic variation to compensate for changes in supply voltages or welding conditions were described.

Silicone Production.—Imperial Chemical Industries Ltd. are building a new plant at Ardeer, Scotland, to manufacture, in commercial quantities, silicone chemicals. Products from this plant will be shown at the forthcoming Scottish Industries Exhibition in Glasgow.

READER SERVICE SECTION

Items in the following list of manufacturers' literature are available as a personal service to readers of INDUSTRIAL FINISHING *by using the reply card below.*

In addition, the editorial staff of INDUSTRIAL FINISHING *are always available as an advisory service on questions affecting finishing.*

Rust and Shipping. A 16-page, amply illustrated booklet describes the pre-treatment of ships by the rust remover and neutraliser of a well-known firm. A number of case histories of the use of the process in recent years are given, together with technical notes and an explanation of the scope of the firm's after-sales service. Jenolite Ltd., 43 Piazza Chambers, London, W.C.2. (100)

"How Automatic Can We Get?" A large specialist firm in the field of automatic control and instrumentation have reprinted, in a 16-page booklet, a recent talk given by the President of a division of their associated American company on automation. He assesses the stage automation has reached at present and the part it will play in the future in increasing efficiency and economy. Honeywell-Brown Ltd., 1 Wadsworth Road, Perivale, Middlesex. (101)

Metal Spraying. A well-illustrated, attractive booklet explains the British wire process of metal spraying. It describes the uses of various metals, special machines, preparation, the control of thickness and quality, the method of building up of worn parts. In conclusion five pages are devoted to a presentation of the theory of metal spraying. Metallisation Ltd., Barclays Bank Chambers, Dudley, Worcs. (102)

Multi-Duty Mill for Grinding, Polishing, etc. Illustrated brochure gives details of a compact motorised unit which enables a range of processes to be carried out cheaply by fitting a number of different attachments to the standard three speed driving unit. Pot mills of capacities of ¼ gal. to 3 gal., made in porcelain, stainless

---

CIRCLE ITEMS YOU DESIRE

CUT OUT AND POST THIS CARD

INDUSTRIAL FINISHING

157 HAGDEN LANE, WATFORD, HERTS.

I should like a copy of each piece of Manufacturers' Literature specified by number circled below.

NOTICE: Students and other than United Kingdom subscribers should request literature directly from manufacturers.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	
44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	
65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	
107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	
149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	
170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	
191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	
212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	
233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250				

PLEASE PRINT

Name _____ **Position** _____

Firm _____

Address _____

READER SERVICE

steel or rubber lined can be fitted for wet or dry grinding, and an octagonal barrel of 0·65 cu. ft. capacity for polishing. Podmores (Engineers) Ltd., Shelton, Stoke-on-Trent. (103)

Insulating Board for Ovens and Driers. A booklet gives technical data, diagrams and instructions for use of a strong incombustible sheeting for drier construction. Because of its rigidity and low thermal conductivity it can be used as a replacement for both steel and insulation in the drier. The sheeting is unaffected by water and corrosion, and can be supplied glazed for painting. Marinite Ltd., 114-116 Park Street, London, W.1. (104)

Bituminous Solutions, Paints, Enamels and Compositions. A range of bituminous products is described in a coloured, illustrated booklet. It covers a black solution for industrial and marine uses with a more viscous heavy-duty version, a heat-resistant paint, an elastic protective coating, a bituminous enamel, a water tank solution and water tank enamel, and a non-oxidising solution. General hints for handling the solutions and enamels are given with the individual applications of each. International Paints Ltd., Grosvenor House, Grosvenor Gardens, London, S.W.1. (105)

Marking Machines. Brochure, details and pictures a range of marking machines for marking articles of all shapes. A range of numbering heads is also shown on the pamphlet. They consist of light and heavy patterns and rolling machine patterns. Table gives details of steel types available. The Standwell Equipment Co. Ltd., Worple Mews, Worple Road, Wimbledon, S.W.19. (106)

Plating Barrel. A pamphlet describes, with illustrations, a barrel plating unit with electric motor and transmission of high cathode efficiency. Rubber lined, the barrel is of 12 gal. capacity at the usual plating angle of 40°; angle of rumbling can be changed by foot operated pedal. Claimed output 28 lb. to 40 lb. per load every 20 min. Open barrel ensures easy inspection at any period of operation. Roval Ltd., Bilton Way, Brimsdown, Enfield, Middlesex. (107)

Unit Heaters for Industrial Buildings. A number of industrial heaters are described and illustrated in a coloured brochure. The standard heating unit for use where the fixing height does not exceed 12 ft. can operate on steam, high or low pressure hot water, or electricity. Downward discharge heaters are for use in large factories where the fixing height needs to exceed that of the standard horizontal discharge model. F. H. Biddle Ltd., Vectair House, Clerkenwell Close, London, E.C.1. (108)

Circle items you desire on reverse side, cut out and post this card.

PRINTED PAPER RATE

1½D. STAMP REQUIRED

INDUSTRIAL FINISHING

PERSONAL READER SERVICE

157 Hagden Lane,

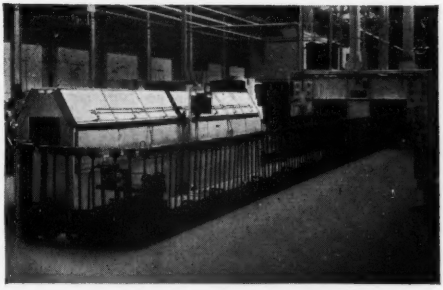
Watford,

Herts.

. . . but it takes far less time to dry

with GAS INFRA-RED

In factories all over Britain GAS INFRA-RED is speeding up processes and cutting production costs. Here is a typical example—3 minutes to dry domestic tinware instead of 30. This result is achieved by 28 Gas Infra-Red panel units, working in conjunction with a floor mounted conveyor and electrostatic spraying plant.
Whatever you make in metal—domestic tinware or motor-cycle frames—a Parkinson and Cowan GAS INFRA-RED installation will speed production.



PARKINSON AND COWAN INDUSTRIAL PRODUCTS

(A Division of Parkinson and Cowan Limited)

Dept. U, COTTAGE LANE WORKS, CITY RD, LONDON, E.C.1 Phone: Clerkenwell 1766/7

IR36

NEAT GAS BURNER APPLICATIONS OF FINISHING INTEREST. — (*Continued from page 65.*)

strains after cold working. The arrangement in both cases was similar in principle, Fig. 5 being a diagrammatic illustration.

It will be seen from the drawing that we have attempted to produce circulation of products by natural forces rather than by mechanical means. In the case of the aluminium foundry this was quite easy as an existing brick built chamber, 7 ft 6 in. high, was utilised by mounting a pair of doors on the open end, the height of the oven with about four feet of external flue pipe being sufficient to create the "pull" necessary to draw the products down to the bottom flue port.

The brass rod oven was rather different, being as it were, laid down rather than stood up, and in this case we used an eductor, air being available to create the necessary downward pull.

Whilst on the subject of stress relieving, another application of very recent vintage may perhaps be quoted, again from the point of view of "one-off." Although this is not strictly a "one-off" it is a situation which arises at irregular and unpredictable intervals; a large steel casting has been welded, perhaps for a blow-hole or for careless fettling; the annealing ovens are full and in their cycle and the casting must not be allowed to cool down. We have, therefore, "concocted" an oven, in size and shape somewhat like a pigsty with a lid on. The front consists of a door and the roof is also removable so that castings of all sizes can be placed in either by hand or by crane. A row of neat gas burners is situated at floor level along one wall and air ducts of sheet metal run slightly below and parallel to this row. Air is blown in at 6 in. w.g. and flue ports have been left at the base of the opposite wall. The burners and ducting are separated from the main oven space by a single brick wall two feet high, thus creating a circulating effect and also preventing damage from the steel castings during loading and unloading operations.

Names in the News

Appointments

MR. H. G. HIGGINSON

Sales Manager to Perl Controls Ltd.

MR. H. G. HIGGINSON, M.S.M.A., has recently been appointed as sales manager to Perl Controls Ltd.

Mr. Higginson received his apprenticeship training with the Gas Light and Coke Co., and represented them at the 1933 Camp of the late King, who was at that time Duke of York.

After some years with Vickers-Armstrongs Ltd., he joined Bratt, Colbran Ltd., as technical sales representative and early in 1950 took over the industrial sales as industrial manager.

Mr. Higginson is a member of the Incorporated Sales Managers' Association and of the Institute of Metal Finishing.

MR. R. ASHLEY HALL

There was an interesting ceremony at a recent luncheon meeting of the Bristol Paint, Colour and Varnish Manufacturers Association when Mr. J. S. Frith, chairman, presented to Mr. Ashley Hall, president of the National Paint Federation, a table lighter and silver ash tray on an ebonised stand with, mounted on it, a silver plate bearing the inscription: "Presented by the Bristol Association to mark the Presidency of Mr. R. Ashley Hall, 1954." Mr. Norman J. Campbell, director of the Federation, was one of the guests at the luncheon.

The Bristol Association had now provided three presidents of the National Paint Federation, the other two being the late Mr. C. F. A. Hare and Mr. S. Romilly Hall, who was present that day.

Mr. J. S. Armstrong

JENOLITE LTD. of 43 Piazza Chambers, Covent Garden, London, W.C.2, have appointed Mr. J. S. Armstrong to be Marine Representative in their Technical Department at 13-15 Rathbone Street, W.1. Mr. Armstrong, who is forty-seven, was for eleven years a Chief Officer in the Merchant Navy, and has had considerable experience of corrosion problems in shipping.

Mr. J. S. Armstrong—Jenolite's forty-seven-year-old new Marine Representative.

He will be specifically engaged as a consultant to the industry on all matters

The Metal Finishers

General Metal Finishing Processors to Industry.

ESTABLISHED 1922

Protective, Durable and Decorative.

MEMBER OF THE METAL FINISHING ASSOCIATION

Our aim is to be helpful to manufacturers in suggesting alternative Finishes for their products.

ASHTON and MOORE (METAL COLOURERS) LTD
3, LEGGE LANE, BIRMINGHAM 1. Tel: CENtral 2234
PLATING TO B.S.1 OR OTHER STANDARDS ON MINISTRY OF SUPPLY LIST NO. 7.4.9.6.8.6/38

relating to marine corrosion and its cure. His home address is 10 Meril Gardens, West Hartlepool, Durham.

Blundell, Spence Acquire Vulcan Products, Mr. E. B. Calvert Appointed Chairman.—Blundell, Spence and Co. Ltd., the paint manufacturers, have acquired a controlling interest in Vulcan Products Ltd., of London and Slough, who are manufacturers of transport and other specialised paints and finishes.

Mr. E. B. Calvert, chairman and managing director of Blundell, Spence and Co. Ltd., has been appointed chairman of Vulcan Products Ltd. and its subsidiary, Paint Removers Ltd., in succession to Mr. Leonard Wilmin, who has retired. Mr. F. R. Eden continues as a Director and General-Manager of Vulcan Products Ltd.

Blundells, whose works are at Hull, also have a direct controlling interest in John J. Bowater Ltd. of West Bromwich and in companies in Australia and India.

Mr. N. J. Shergold.—Air Control Installations Ltd. are opening a new branch office in the Newcastle-on-Tyne area, and have appointed their Mr. N. J. Shergold as branch manager. Enquiries should for the present be addressed to Mr. Shergold at 76 Holywell Avenue, Whitley Bay, Northumberland (Telephone: Whitley Bay 23046). Mr. Shergold has had extensive experience of fan and air treatment engineering, and Air Control Installations are confident that the new office will enable them to give extended service to old and new friends in the North East.

Mr. H. M. Arnold Appointed J.O.C.C.A. Editor.—Mr. M. H. M. Arnold, B.A., B.Sc., F.R.I.C., A.M.I.Chem.E., technical manager of Postans Ltd., Birmingham, has been appointed hon. editor of the *Journal of the Oil and Colour Chemists' Association*, filling the vacancy created by the resignation of Dr. R. F. Bowles. He will be acting editor until the appointment is confirmed at the next annual general meeting of the Association.

For some time Mr. Arnold was hon. publications secretary and hon. research and development officer of the Midland Section of O.C.C.A., and he then showed a critical judgment of papers. He was educated at Repton School and Magdalen College, Oxford, where he obtained a first-class honours degree in chemistry, with biochemistry, in 1937. From 1937 to 1946 he was employed at the Billingham Division of Imperial Chemical Industries Ltd., and engaged on research and plant management. In 1946 he became research manager at BX Plastics Ltd., and he joined his present company in 1947.

THE WORLD'S *BEST* GUNS

The A.I.D. Model 2 and Model 7 guns fall right into line with the need of industry to effect increased production and saving of man-hours. Their economical performance and mechanical perfection have made them the outstanding choice of great industrial organisations and Government Service Depts. all over the world.

AND THE WORLD'S *BEST* SERVICE

A.I.D. INSTANT RESERVE REPLACEMENT SERVICE ensures 100 per cent. man-hour efficiency every hour of every day. New or reconditioned guns are exchanged instantly for worn or damaged guns. A.I.D. not only supply guns, but EVERYTHING behind the gun. Whatever your needs do not hesitate to request the services of our technical organisation.

The Greatest Name In Spray Painting Equipment

CONTRACTORS TO THE WAR DEPARTMENT OF THE U.S.A. THE BRITISH AND COMMONWEALTH GOVERNMENTS

Sole Manufacturers: AIR INDUSTRIAL DEVELOPMENTS LIMITED, Aidspray Works, Shenstone, nr. Lichfield, Staffs, England. Phone: Shenstone 341/5. Grams: Aidspray, Shenstone. London, 28 South Molton Street, W.1. Phone: Mayfair 6318.

Goodall Brand

ROTARY BRUSHES

Our wide range of Rotary Fibre Polishing Wheels includes brushes suitable for every purpose whether for use on automatic or hand polishing machines.
If you have a brushing problem why not consult us?

THE AIRCOOL BIAS BRUSH (Hand Polishing and Automatics)

Plain sided WIRE STITCHED BRUSH (Hand Polishing)

Stitched heavy duty BRUSHING WHEELS (Hand Polishing and Automatics)

Wood sided CALICO INTERLEAVED BRUSH (Hand Polishing)

JOHN HAWLEY & CO. (WALSALL) LTD.
GOODALL WORKS
BLOXWICH ROAD. WALSALL. STAFFS
Established 1837
Telephone: BLOXWICH 66251 Telegrams: ROPE, WALSALL

SCAFFOLD POLE CLEANING

with

TILGHMAN'S
WHEELABRATOR PLANT
REG'D TRADE MARK

The Scaffold Pole Cleaning Plant illustrated is capable of speeds up to 20 ft. per minute. The intake end of the plant is shown, with a scaffold pole entering for processing.

Let us solve
YOUR
cleaning problems!

TILGHMAN'S PATENT SAND BLAST CO. LTD.,
Broadheath, near Manchester - - - - *Telephone:* ALTrincham 4242/7

LONDON OFFICE: 1 Chester Street, S.W.1.
AGENTS: Midlands: R. J. Richardson & Sons Ltd., Commercial Street, Birmingham.
Scotland: Balbardie Ltd., 110 Hanover Street, Edinburgh.

AN INVITATION

To individual readers: The Personal Reader Service Section facing page 68 is for your use and convenience, do you make use of it?

To firms interested in finishing shop supplies: You are invited to send in material suitable for inclusion in the above feature, there is no charge for this service and it is operated in our mutual interest.

FIRE!

OUR WORKS LOST BUT FOR

NU-SWIFT!

"It seemed incredible... flames shot up everywhere... but we recharged each Nu-Swift six times and saved our factory... please send us 108 replacement charges."

NU-SWIFT LTD · ELLAND · YORKS

In Every Ship of the Royal Navy

Colosyl

DEGREASANTS

FOR REMOVING BUFFING COMPOUNDS, OIL, GREASE, GRAPHITE, ETC.

★ **Cut production costs. Can be used Electrolytically. Hold grease in suspension and prevent grease film forming.**

★ **Do not tarnish polished brass, nickel silver or similar alloy.**

★ **Clean brass, steel, aluminium and manganese bronze.**

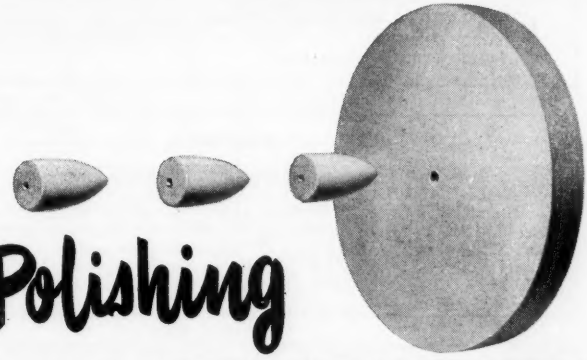
★ **Give a chemically clean surface for plating, stove enamelling, etc.**

Write for full particulars.

Demonstrations gladly arranged.

INDUSTRIAL COLLOIDS LIMITED

Altrincham Bridge Manchester ALT 2328/9



For Polishing

COOPERS FELT MEETS TODAY'S NEEDS

In 6 grades from soft to rock hard, and 4 qualities from medium grey to superfine high-quality white, our range of polishing bobs includes the ideal wheel for every class of work. Send for our free, illustrated brochure today.

COOPERS FELT

Please send all enquiries to:

Head Office & Works: Cooper & Co. (B'ham) Ltd., Brynmawr, Breconshire

Telephone: Brynmawr 312 **Telegrams: Felting Brynmawr**

Registered Office and Works: Little King Street, Birmingham 19

ADVERTISERS' INDEX

Adhesive Dusters ... ... —
Advanced Anodising and Plating Co. Ltd. ... ... —
Aeraspray Manufacturing Co. Ltd., The ... ... —
Aerograph Co. Ltd., The 17
Aerostyle Ltd. 15
Air Industrial Developments Ltd.... 71
Allied Paints and Chemicals Ltd. —
Ashton and Moore (Metal Colourers) Ltd. 70
Atlas Diesel Co. Ltd. ... ... —
Atlas Plating Works Ltd. ... 75
Ault and Wiborg Group *Cover* iii
Ballard, F. J. & Co. Ltd. 20
Bennett (Hyde) and Co. Ltd. ... —
Berger, Lewis (Great Britain) Ltd. —
B.H. Chemicals Ltd. 4
Bratt Colbran Ltd. ... ... —
British Electrical Development Association 6
British Oxygen Co. Ltd. 3
British Paints Ltd. ... ... *Cover* iv
British Vapour Blast Ltd. ... ... —
Brough, E. A. and Co. Ltd. ... —
Bullows, E. and Sons Ltd. ... ... —
Canning, W. and Co. Ltd. 10
Carrier Engineering Co. Ltd. ... —
Carr's Paints Ltd. 41
Controlled Heat and Air Ltd. ... —
Cooper and Co. (B'ham) Ltd. ... 73
Cox Bros. and Co. (Derby) Ltd. ... 8
Croda Ltd. ... ... —
Cruickshank, R. Ltd. 35
Curran, E. Engineering Ltd. ... —
Cyclo Gear Co. Ltd. ... ... —
Dawson Bros. Ltd. ... ... —
De La Rue, Thomas and Co. Ltd. ... ... —
Delta Technical and Commercial Services ... ... —
Docker Bros. ... ... —
Drummond Patents (Holdings) Ltd. 59
Electric Construction Co. Ltd., The —
Electro-Chemical Engineering Co. Ltd., The ... ... —
Evershed and Vignoles Ltd. ... —
Fishburn Printing Ink Co. Ltd. ... —
Fletcher, Miller Ltd. ... ... —
Gas Council, The 13
Geigy Co. Ltd. 16
General Electric Co. Ltd., The ... —
General and Industrial Paints Ltd. —
Gittings and Hills Ltd. ... ... —

FOR SALE

THREE INFRA-RED GAS PANELS, complete with canopies, for disposal at any reasonable price. Apply Box No. 97, INDUSTRIAL FINISHING, 157 Hagden Lane, Watford, Herts.

FOR SALE

THREE TANKS each 10 ft. 0 in. long by 7 ft. 3 in. wide by 2 ft. 8½ in. deep made of ⅜ in. plate stiffened with 1½ in. angles, fitted with filter screens and ball and overflow connections, together with four heating coils by 2 in. bore for working under 20 lb. p.s.i. steam complete with coil stands. May be seen Bognor. Offers invited for the whole or separate lots. Box No. 98, INDUSTRIAL FINISHING, 157 Hagden Lane, Watford, Herts.

APPOINTMENT VACANT

WESTCLOX LTD., Clock and Watch Manufacturers, Strathleven, Dumbarton, Scotland, have a vacancy for an Assistant Foreman in their modern, well equipped Finishing Department. Applicants should be young, of good education and have previous experience in Spray Painting, including Infra Red Stoving on a mass-production basis. The ability to supervise personnel and work on own initiative is essential. A good salary will be paid. The Company has Group Life Insurance and Pension Schemes. Housing will be discussed at interview. Please reply in writing giving full details of experience, education and ability, to Personnel Department, Strathleven, Dumbarton.

ADVERTISERS' INDEX

Goldsworthy, Thomas and Sons Ltd. ... ... —
Goodlass, Wall and Co. Ltd. ... 51
Grauer and Weil Ltd. 76
Griffiths, A. E. (Smethwick) Ltd.... 18
Harefield Industrial Paints Ltd. ... —
Hall, John and Sons (Bristol and London) Ltd. 37
Hawley, John and Co. (Walsall) Ltd. 72
Heat and Air Systems Ltd. ... —
Hockley Chemical Co. Ltd., The 12
Holden, Arthur and Sons Ltd. ... —
Honeywell-Brown Ltd. 25
Industrial Colloids Ltd. 73
Industrial Fan and Heater Co. Ltd. 63
International Paints Ltd. 53
Imperial Chemical Industries Ltd. (Paints Division) ... ... —
Incandescent Heat Co. Ltd. ... —
Ingham, Clark, Robert and Co. ... —
Ionic Plating Co. Ltd. ... ... —
Jenolite Ltd. 7
Jenson and Nicholson Ltd. ... —
Kaylee Transfers Ltd. ... ... —
Kearsley, Robert and Co. ... ... —
Learner, A. and Co. Ltd. ... ... —
McDowell, Thomas and Co. Ltd.... —
Macpherson, Donald and Co. Ltd. 63
Mander Bros. Ltd. 33
Mercol Products Ltd. ... ... —
Metallisation Ltd. ... ... —
Metal Porcelains Ltd. ... ... —
Metropolitan-Vickers Electrical Co. Ltd. 11
Midland Galvanizers Ltd. — ... 14
Minnesota Mining and Manufacturing Co. Ltd. ... ... —
Modern Industrial Ventilation and Oven Co. Ltd. ... ... —
Morris, B. O. Ltd. 5
Nu-Swift Ltd. 73
Neil and Spencer Ltd. ... ... —
Norgren, C. A. Ltd. ... ... —
Oakey, John ... ... —
Parkinson and Cowan (Gas Meters) Ltd. 69
Parsons, Thomas and Sons Ltd. ... 14
Perfectair Ltd. ... ... —
Pinchin, Johnson and Associates Ltd. 1
Postans Ltd. ... ... —
Preston, John and Co. Ltd. *Cover* i
Prodorite Ltd. ... ... *Cover* ii
Pyrene Co. Ltd., The 55
Radiant Heating Ltd. ... ... —
Radiant Metal Finishing Co. Ltd.... —
Round, B. J. Ltd. 2
Scrib Ltd. (Metal Section) ... ... —
Shell Chemicals Ltd. 9
Smith and Walton Ltd. ... ... —
Spencer and Halstead Ltd. ... —
Spraytex Ltd. ... ... —
Sterne and Co. Ltd.... ... ... —
Stordy Engineering Ltd. ... ... —
Sunbeam Anti-Corrosives Ltd. ... 45
Tack All Tackrag (Eng.) Ltd. ... —
Technical Brushes Ltd. ... ... —
Teleflex Products Ltd. ... ... —
Thornley and Knight Ltd.... ... —
Thompson Bros. Ltd. ... ... —
Tilghman's Patent Sand Blast Co. Ltd. 72
Tool Treatments Ltd. ... ... —
Trapinex Ltd. ... ... —
Vacuum Industrial Applications Ltd. —
Walterisation Ltd. ... ... —

VAT AND BARREL PLATING of Chrome, Nickel, Brass, Copper, Zinc, Bright Zinc, Silver, Gold, Cadmium, etc.

Anodising, Bright Dipping, Bronzing, Frosting Aluminium, Polishing and Lacquering, Plating and Bronzing on Aluminium.

ROTO-FINISHING for BURNISHING and DEBURRING.

PROTECTIVE FINISHES FOR ARMAMENTS.

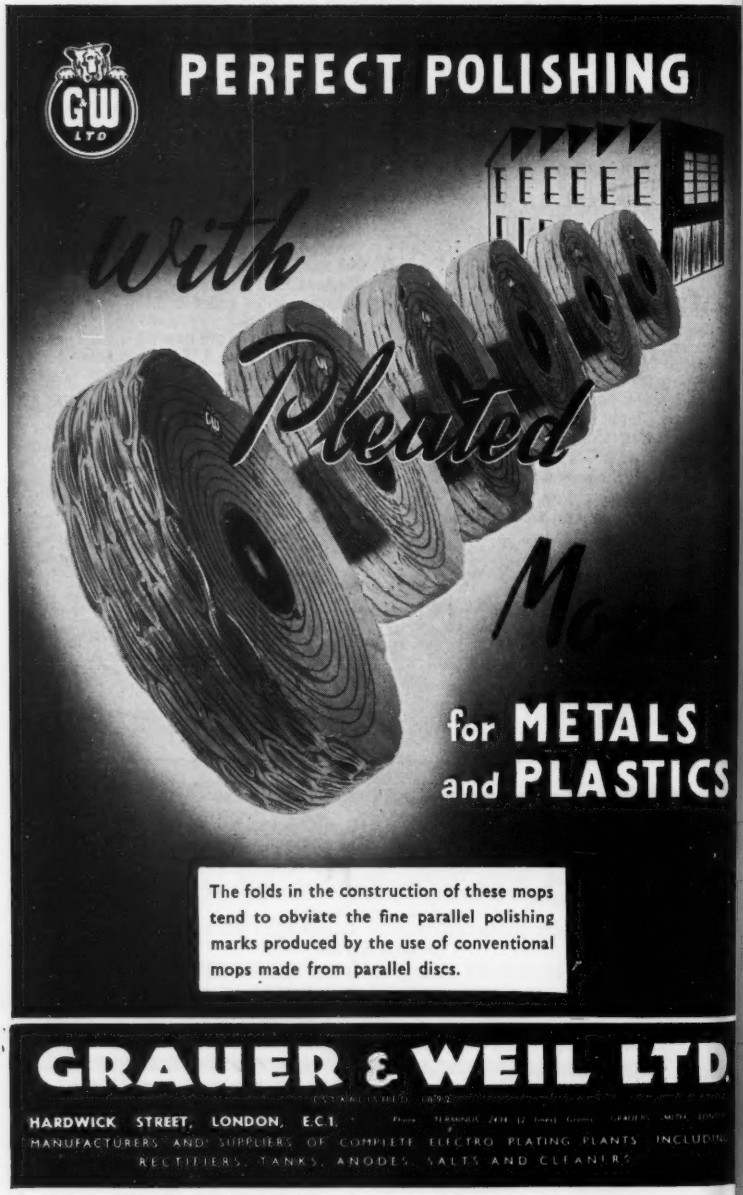
HARD CHROME **ELECTRO-FORMING.**

ATLAS PLATING WORKS LTD., Avenue Rd., Acton, W.3. *ACORN 1102 (3 lines)*
Barrel Plating Works, 8/10 INGATE PLACE, Queenstown Rd., Battersea. *Macaulay 2976*

ATLAS PLATING WORKS LTD

This is an Arrow Press Publication. Published Monthly.
Subscription Rate 30*s. per annum.*
Published by Arrow Press Ltd. at 157 *Hagden Lane, Watford, Herts.*
Telegrams: "Techpress, Watford." Telephone: Gadebrook 2308/9.

MADE AND PRINTED IN GREAT BRITAIN FOR THE PROPRIETORS, ARROW PRESS LTD., BY THE SIDNEY PRESS LIMITED, LONDON AND BEDFORD.

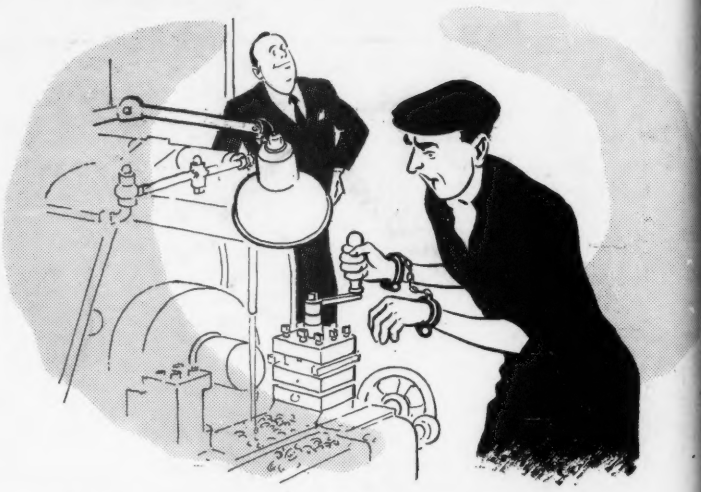

G&W LTD
PERFECT POLISHING
With
Pleated
for METALS
and PLASTICS
The folds in the construction of these mops tend to obviate the fine parallel polishing marks produced by the use of conventional mops made from parallel discs.
GRAUER & WEIL LTD.
ESTABLISHED 1892
HARDWICK STREET, LONDON, E.C.1.
MANUFACTURERS AND SUPPLIERS OF COMPLETE ELECTRO PLATING PLANTS INCLUDING
RECTIFIERS, TANKS, ANODES, SALTS AND CLEANERS

ANTONY WHEREWITHAL FEELS AT HOME . . . lying at ease, reading his evening newspaper. Little does he realise how much is contributed to his comfort by products of the Ault & Wiborg Group. His newspaper, for a start, was printed on a fast-running News Press using Ideal Rollers and AW news inks. The popular magazines were produced with AW high-speed gravure inks. The heat resisting enamel of the electric fire is another AW product. The side table has a glossy AW wood finish and so have the chairs, radio cabinet and bookcases. The cigarette box is printed, coated and lacquered with AW Tin Printing Inks and Metal Decorating products. Even the finish on Mr. Wherewithal's car comes from an AW factory. Antony chose his possessions first because each has an eye-appeal — and eye-appeal supplied by the printing inks, decorative and protective coatings of the AW Group has sales appeal to everyone.

AULT & WIBORG GROUP

PRINTING INKS · PRINTER'S ROLLERS AND SUNDRIES · INDUSTRIAL FINISHES DECORATIVE PAINTS METAL DECORATING PRODUCTS

AULT & WIBORG LIMITED STANDEN ROAD, SOUTHFIELDS, LONDON, S.W.18. TEL: PUTNEY 7222 (20 LINES)



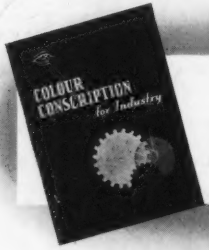
How to arrest Production

You need not use handcuffs to put a brake on production. Physical and Mental effort is being slowed down quite effectively in thousands of factories in a less spectacular, though equally efficient manner.

In nearly every factory and workshop where paint is used in the old traditional way production suffers as a consequence. Do we suggest, then, that paint can be used to improve production? Not only can it be so used; it is being used with that result by leading organisations.

Our Handbook "Colour Conscription for Industry" shows how colour can be employed to make seeing easier at the workbench; its effect upon output; how it may be used to combat fatigue; its influence upon absenteeism.

"Colour Conscription" has been written for the busy executive who wishes to obtain a quick understanding of the simple principles involved; it can be read in half an hour; it is well illustrated. It will help you.



Complimentary copies of "Colour Conscription for Industry" are available to Principals. A charge of 10/6d. will be made to others.

BRITISH PAINTS LIMITED

PORTLAND ROAD, NEWCASTLE UPON TYNE